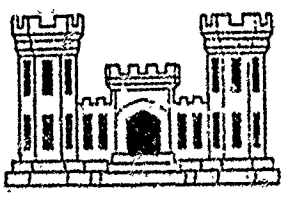
STILWELL LAKE DAM

ORANGE COUNTY, NEW YORK

INVENTORY NO. 770

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



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NEW YORK DISTRICT CORPS OF ENGINEERS

DECEMBER 1978

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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Visual Inspection
Hydrology, Structural Stability
Stilwell Lake Dam
Orange County
U.S. Military Academy - Fort Montgomery

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

Visual observations made during the course of the inspection did not indicate any severe structural deficiency or mechanical malfunction which would adversely affect the immediate safety or stability of the dam.

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The total discharge capacity of the spillway and the regulating outlets is approximately 39,975 cfs. This is greater than the estimated Probable Maximum Flood (PMF) of 24,245 cfs, therefore, the project discharge capacity is adequate.

No remedial measures are required to assure the safety of the dam at the present time.

Some measures are recommended and included in Section 7 of the Inspection Report.

(1)

(6) National Dam Inspection Program.

STILWELL LAKE DAM

ORANGE COUNTY, NEW YORK

INVENTORY ~~NO. 770~~ Number NY 770

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

(11) Dec 78

(10) Eugene O'Brien

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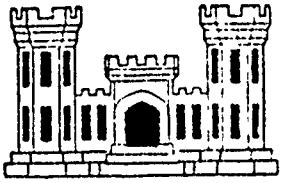


(15) DACW51-78-C-0024

Prepared by: TIPPETTS-ABBETT-McCARTHY-STRATTON

NEW YORK DISTRICT CORPS OF ENGINEERS

DECEMBER 1978

AD A111046

HUDSON RIVER BASIN
STILWELL LAKE DAM
INVENTORY NO. 770
PHASE I INSPECTION REPORT

CONTENTS

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	STILWELL LAKE DAM (I.D. NO. 770)
State Located:	NEW YORK
County Located:	ORANGE
Stream:	POPOLOPEN BROOK
Date of Inspection:	DECEMBER 5, 1978

ASSESSMENT

Visual observations made during the course of the inspection did not indicate any severe structural deficiency or mechanical malfunction which would adversely affect the immediate safety or stability of the dam.

The total discharge capacity of the spillway and the regulating outlets is approximately 39,975 cfs. This is greater than the estimated Probable Maximum Flood (PMF) of 24,245 cfs, therefore, the project discharge capacity is adequate.

No remedial measures are required to assure the safety of the dam at the present time.

Some measures are recommended and included in Section 7 of the Inspection Report.

Eugene O'Brien

Eugene O'Brien, P.E.
New York No. 29823

Approved by: Col. Clark H. Benn
New York District Engineer

Date: 11 March 80

1. OVERVIEW OF SPILLWAY AND RESERVOIR VIEWED FROM RIGHT NON-OVERFLOW MONOLITH

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
STILWELL LAKE DAM, INVENTORY NO. 770
HUDSON RIVER BASIN
ORANGE COUNTY, NEW YORK

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase 1 Inspection reported herein was authorized by the DEPARTMENT OF THE ARMY, NEW YORK DISTRICT, CORPS OF ENGINEERS by Contract No. DACW 51-78-C-0024, Modification No. P 00002, in fulfillment of the request by the Commandant, United States Military Academy in accordance with criteria specified in the National Dam Inspection Act, Public Law 92-367, 8 August 1976.

b. Purpose of Inspection

The purpose of this inspection and report is to investigate and evaluate the existing conditions of subject dam in order to: identify deficiencies and hazardous conditions; determine if they constitute hazards to human life or property; and notify the Commandant of the United States Military Academy of these results along with recommendations for remedial measures where necessary.

1.2 DESCRIPTION OF THE PROJECT

a. Description of Dam and Appurtenances

Stilwell Lake Dam is a concrete gravity dam which trends about north-south and consists of a dropped center spillway and eight non-overflow monoliths. The length of spillway is 160 feet. The height of spillway crest is at El 602.0, about 43 feet above the bedrock foundation. The lengths of the north and south non-overflow monoliths are 120 feet and 200 feet, respectively. The maximum height of the non-overflow monolith is about 61 feet above its foundation. The differential height between the top of the non-overflow monolith at El 617.8 and spillway crest is 15.8 feet.

Two spray walls are located along both sides of the spillway to contain the flows. The spray walls are extended downstream by gravity retaining walls with stone filled drains behind the walls.

Two core walls 85 feet and 35 feet long are extended from the ends of the north and south non-overflow monoliths respectively into sound rock.

An intake chamber is provided in the north non-overflow monolith approximately 46 feet north of the spillway. The chamber has two 20-inch diameter sluice gates at different elevations which control discharges through 20-inch diameter cast iron pipes. A steel "A" type hoist frame, located at the top of the chamber, can be used to lower and raise the intake screens.

A 36-inch diameter cast iron low level outlet pipe, located 15 feet south of the spillway centerline, can be used to lower the water level in the reservoir for maintenance and in the case of an emergency. A bell-mouth pipe entrance is provided with bar screen. Stoplogs are also provided to permit repairs to the valve located in the drainage and grouting gallery.

A 5-foot wide by 7-foot high drainage and grouting gallery is located in the spillway monoliths at El 565 and extends into both non overflow monoliths. Access to the gallery is provided by two gates on the downstream face of the non-overflow sections. Pipes, 3 inches in diameter on 5-foot centers, have been drilled for the purpose of creating a grout curtain. Pressure relief pipes, 6 inches in diameter on 20 foot centers, are provided near the downstream face of the gallery wall with outlets draining into a gutter. Seepage collected in the gutter can be emptied through two 6-inch diameter drains leading to the downstream face of the spillway.

b. Location

The dam is located approximately 5 miles southwest of the United States Military Academy, about 2 1/2 miles west of the town of Fort Montgomery.

c. Size Classification

The dam is greater than 40 feet high but less than 100 feet high, therefore, classified as an "intermediate" dam.

d. Hazard Classification

The dam is in the "significant" hazard potential category because of the few isolated homes located a short distance downstream from the dam.

e. Ownership

Stilwell Lake Dam is owned by the United States Military Academy. The day-to-day operation and maintenance of the operating facilities is managed by the Water Plants Section of the Utilities Division. The maintenance of the dam is managed by the Buildings and Structures Section of the Buildings and Grounds Division. Both Divisions are directly responsible to the Directorate of Facilities Engineering, United States Military Academy.

f. Use of Dam

The impoundment provided by the dam is for water supply and recreational purposes.

g. Design and Construction History

The dam was designed by Alexander Potter Associates, Architect-Engineers of New York City. It was constructed and completed in November, 1948 by the U.S. Army Corps of Engineers. Design data, calculation and as-built drawings can be obtained from the Directorate of Facilities Engineering, United States Military Academy.

h. Normal Operating Procedures

The water level in the reservoir is usually maintained to the spillway crest with the upper sluice gate open. During September to April, water passes over the spillway crest with flashboards in the open position.

1.3 PERTINENT DATA

a. Drainage Area (square miles)	12.5
b. Discharge at Dam Site (cfs)	
Maximum regulating gate outlets	285
Ungated Spillway at maximum pool, El 617.8	39,690
Total Spillway capacity at maximum pool, El 617.8	39,975
c. Elevation (feet above MSL)	
Top of Dam	617.8
Maximum pool-design surcharge	617.8
Crest of Spillway (ungated)	602
Streambed at centerline of dam	560
d. Reservoir (miles)	
Length of Maximum pool	0.75
e. Storage (acre-feet)	
Crest of Spillway, El 602	1920
Top of dam, El 617.8	9465
f. Dam	
Type:	Concrete gravity
Length:	480 feet
Height:	58 feet ±
Side Slopes:	Upstream: vertical at top 8V on 1H at bottom Downstream: 10V on 8H
Top Width:	9.67 feet
Grout Curtain:	3-inch diameter grout pipes spaced at 5 foot centers

g. Spillway

Type:	Concrete Ogee Weir section
Length:	160 feet
Crest Elevation:	602

h. Regulating Outlets

Two 20-inch diameter sluice gates are located at El 592 and El 585. They are connected to a common 20-inch diameter cast iron pipe with its outlet at El 565.5. A gate valve is provided to regulate the discharge.

A 36-inch diameter cast iron pipe is located at El 562. A valve is provided in the drainage and grouting gallery to regulate the discharge.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

Design data, engineering information and as-built drawings are available for evaluation of the original design of the dam. There are no records available of any design changes to the dam.

2.2 CONSTRUCTION RECORDS

There are no construction records available for the project.

2.3 OPERATION RECORDS

There are no operation records available.

A record of reservoir elevation and rainfall are kept daily and are available at the Lusk Reservoir Water Treatment Plant.

2.4 EVALUATION OF DATA

Information and drawings were made readily available by personnel of the Water Plants Section of the Utilities Division and the Civil Section of the Engineering Plans and Services Division; Directorate of Facilities Engineering, United States Military Academy.

The information obtained from available data, the personal interviews and the visual inspection are considered adequate for this Phase I inspection and evaluation.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General

A visual inspection of Stilwell Lake Dam was made on December 5, 1978. At that time the reservoir level was at El 599±, about 3 feet below spillway crest.

Water was discharging from the 20-inch diameter cast iron pipe into the spillway bucket. The water level at the bucket was maintained at the top of bucket sill by discharges from two 12-inch diameter drain pipes leading into the downstream channel.

Flashboards on the spillway crest were in an upright position except for those on the monolith adjacent to the north (left) non-overflow monoliths which were in a horizontal position.

b. Dam

Both north and south non-overflow monoliths were in good condition. No displacements of the horizontal and vertical alignments were observed. There was some white mineral deposition along horizontal joints on the downstream face of the dam. No seepage and/or leakage were observed.

c. Spillway

On the downstream face, there was some deterioration of concrete existing in the area near the crest.

There was some spalling along the horizontal and vertical joints. The horizontal joint above the 36-inch diameter low level outlet pipe appears to have a wide gap. There was wetness existing on the concrete face below this gap, but no seepage was detected. Grass was growing along one of the vertical joints.

The wooden flashboards were in deteriorating condition. It was reported that the owner is planning to replace them. It is also reported that an accessway will be installed between the spillway crest and the top of the dam.

d. Appurtenant Structures

The two 20-inch diameter sluice gates in the intake chamber were found to be in operating condition. Downstream, opposite the intake chamber, a 20-inch diameter gate valve and a flow indicator were provided. It appears that the flow indicator is now abandoned and the stem and wheel of gate valve are rusted. It is reported that this gate valve is kept open all the time.

A 36-inch diameter valve located in the drainage and grouting gallery was found well maintained. The valve was closed at the time inspected. It was reported that an original butterfly valve was replaced in 1974.

Inside the drainage and grouting gallery, water has collected to approximately one inch deep. The gutter was full of water and silt. Significant amounts of silt and debris were found deposited near the south end of the gallery to the degree that the two 6-inch diameter gutter drains were blocked. No leakage was observed through joints. On the downstream side of the gallery wall, the entire surface below the first horizontal joint was found wet and covered by white mineral deposits. The entrance gates to the gallery were locked and in good condition.

The railings along south retaining walls were rusted with paint completely peeled off. The lock on the south entrance gate on the top of the dam failed to open with the key inserted.

e. Downstream Channel

Riprap protection is provided on the south (right) bank of the channel. Some debris, broken concrete pipes and bushes were found in the downstream channel.

3.2 EVALUATION OF OBSERVATIONS

Visual observations made during the course of the inspection did not indicate any severe structure deficiency or mechanical malfunction which would adversely affect the immediate safety of the dam. However, there is continuous need of inspection, maintenance and repair programs.

SECTION 4 - OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

During the months of September to April, water passes over the spillway crest with the flashboards open. During May to September the upper sluice gate is opened to maintain the water level about one inch over the spillway crest.

The 36-inch diameter valve located in the drainage and grouting gallery is usually kept closed. This valve is opened when it is desired to maintain the reservoir level not higher than one foot above flashboards so that the flashboards will stay in an upright position.

4.2 MAINTENANCE OF THE DAM

There is no operation and maintenance manual for the dam; however, present maintenance of the project appears adequate.

4.3 MAINTENANCE OF OPERATING FACILITIES

The two 20-inch diameter sluice gates, at the intake chamber, and the 36-inch diameter valve in the drainage and grouting gallery, appear to be in acceptable operating condition. An original 36-inch diameter butterfly valve was replaced in 1974.

Records of daily operation of gates are kept in the office.

4.4 DESCRIPTION OF WARNING SYSTEM IN EFFECT

An electric water level indicator is located at the Water Plant and automatically registers reservoir level. If deemed necessary, Plant personnel will report conditions to a higher authority by telephone communications.

4.5 EVALUATION

There appears to be nothing in the present operational or maintenance procedures which would adversely affect the safety of the project. Overall maintenance of the dam and appurtenant features is considered to be adequate.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 DRAINAGE AREA CHARACTERISTICS

Stilwell Lake is the last significant lake on Popolopen Brook before the Brook enters the Hudson River. The watershed of Stilwell Lake has a maximum length of 6.4 miles in the NE-NW direction and a maximum width of 2.6 miles. The entire watershed, which is wooded and includes many lakes and ponding areas, occupies 8021 acres (12.53 square miles). About 45% (3630 acres) of the area is controlled by Popolopen Lake, the outflow of which, to a degree, is attenuated again, by Mine Lake before entering Stilwell Lake. Mine Lake and a number of other lakes and ponding areas control an additional 29% (2349.2 acres) of the watershed so that flow from only 2041.8 acres can be considered as uncontrolled flow entering Stilwell Lake. It is estimated that the available storage, in the lakes upstream of Mine Lake, a 480.9 acre-feet could attenuate up to 4.64 inches of runoff over that partial area. The estimated available storage over the entire basin of 12.53 square miles is about 3780 acre-feet which is equivalent to approximately 5.5 inches of runoff.

5.2 SPILLWAY CAPACITY

Normal discharges from Stilwell Lake is possible through two low level valve controlled 20-inch diameter cast iron pipe outlets. The spillway is 160 feet in length with an "ogee" shaped crest and has a computed maximum discharge (water level El 617.8) of 39,690 cfs. It is estimated that with the water surface at El 602 the discharge capacities of the 20-inch diameter and 36-inch diameter pipes are 71 cfs and 214 cfs respectively.

5.3 RESERVOIR CAPACITY

According to an available as-built drawing[1] the maximum reservoir capacity (El 617.8) is given as 1455 million gallons or 4465 acre-feet. It is estimated that the surcharge storage between spillway crest El 602 and El 617.8 is 2541 acre-feet.

5.4 FLOODS OF RECORD

There are no stream gages or records of major floods for the Popolopen Brook Watershed. Flow records for gages in the Wallkill River basin indicate that the worst flooded recorded was October 16, 1955.

5.5 DESIGN FLOOD

Because there are no data available on floods for the Popolopen Brook

it was necessary to synthesize the Standard Project Flood.

The Probable Maximum 6-hour rainfall for the United States Military Academy area is 24.4 inches[2]. This amount, adjusted[3] for conformity of generalized isohyetals (in Reference 2) with the shape of the watershed, becomes 19.52 inches. The inflow is based on the sum of the flows entering Stilwell Lake from the directly contributing area (2041.8 acres), the lake area (131 acres), and the outflow from Mine Lake. Inflow to Mine Lake is based on the sum of the flows from the directly contributing area (777 acres), the lake area (24.5 acres), the upstream area affected by ponding (1171 acres), and the outflow from Popolopen Lake. Unit hydrographs, based on the Snyder method[4], and using $C_T = 2$ and 640 $C_p = 400$, were developed for sub-basins VI, VII and X. Flows from all other areas were computed by the instantaneous conversion of excess rainfall to runoff because of the small contributing drainage areas and the negligible lag time. A loss of 0.2 inches per hour was applied to all rainfall over the land areas. The runoff volume equal to the estimated retention capacity of each ponding sub-area was subtracted from the beginning of the flood runoff and in each case the remaining runoff was lagged appropriately before it was added to form the inflow to Mine Lake. The inflow peaks of the Probable Maximum Flood and the Standard Project Flood to Stilwell Lake are 26,291 cfs and 10,170 cfs respectively.

The potential of the dam being overtopped was investigated on the basis of the available surcharge storage and spillway discharge capacity to meet a potential emergency inflow. It was assumed that the lake levels were at spillway crest elevation (Mine Lake El 648.63, and Stilwell Lake El 602) at the start of the flood inflow and the low level outlets were closed during the occurrence. The maximum capacity of the spillway on Mine Lake was calculated to be 1420 cfs. The computed discharge of the Stilwell Lake spillway with the water level at El 617.8, equivalent to the top of the dam, is 39,690 cfs.

5.6 EVALUATION

The PMF and SPF were routed through the lakes using a computerized technique, and resulted in a maximum lake elevation of 613.35 and 607.97 for the PMF and SPF respectively, and with peak outflows of 24,245 cfs and 9232 cfs respectively.

The PMF peak outflow is about 61% of the computed spillway capacity and the spillway is therefore considered adequate.

References

1 As-built drawing titled: USMA Water Supply Dam and Reservoir - Hydrologic and Design Data, drawing no. 512-464, dated November 1948

[2] "Rainfall Frequency Atlas of the United States," USWB Technical Paper No. 40.

[3] Engineering Circular EC 1110-2-27, August 1966

[4] "Flood Hydrograph Analyses and Computations," EM 1110-2-1405

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

Visual observations did not indicate either existing or potential conditions which would adversely affect the safety or structural stability of the dam.

b. Design and Construction Data

Stability design calculations and other engineering data are available from the Directorate of Facilities Engineering, United States Military Academy.

c. Operating Records

The dam has never been overtopped. Thc daily records of reservoir elevations and operation of gates are kept and available at the Water Plant.

d. Post-Construction Changes

There are no records of any post-construction changes except for the 1974 replacement of the 36-inch diameter butterfly valve in the drainage and grouting gallery.

e. Seismic Stability

The dam is located in Seismic Zone No. 1, therefore, no seismic analyses are warranted.

6.2 REVIEW OF STABILITY COMPUTATIONS

The original stability calculations indicated that 50% of the head was assumed for the uplift along the base of the dam. This is not in accordance with the present design practice indicated on Chapter 2, paragraph 2-04 of EM 1110-2-2200, revised November 23, 1960, published by the Corps of Engineers, U.S. Army.

Using the above criteria with an assumed maximum 50% drain efficiency, it is found that for the Design Loading Case III, water surface at El 617.8, the sliding factor would be 0.98. This is greater than 0.65 allowed by the criteria specified in Chapter 3, paragraph 3-03 of the above mentioned manuals.

It should be noted that the water surface for the Probable Maximum Flood (PMF) is 4.5 feet below that assumed for Design Loading Case III. Thus, the sliding factor for the case of PMF would be less than 0.98. In view of the fact that its severity, short duration and unusual occurrence

in nature, the safety against sliding can be considered not critical. Therefore, the stability of the dam is considered adequate.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety

Visual observations made during the course of the inspection did not indicate any severe structural deficiency or mechanical malfunction which would adversely affect the immediate safety or stability of the dam.

The total discharge capacity of the spillway and the regulating outlets is approximately 39,975 cfs. This is greater than the estimated Probable Maximum Flood (PMF) of 24,245 cfs, therefore, the project discharge capacity is adequate.

b. Adequacy of Information

Information and data available are considered adequate for the performance of this investigation.

Records of previous inspections made in April 1976 were not available at the time of this Phase I inspection.

7.2 REMEDIAL MEASURES

No remedial measures are required to assure the safety of the dam at the present time.

Certain measures are recommended as follows:

a. Deteriorated concrete surface and spalling along joints should be monitored so that the repairs can be made when needed.

b. Silt and debris deposited in the drainage and grouting gallery should be removed. The two 6-inch diameter gutter drains should be cleaned to ensure the free-passage of water collected in the gallery.

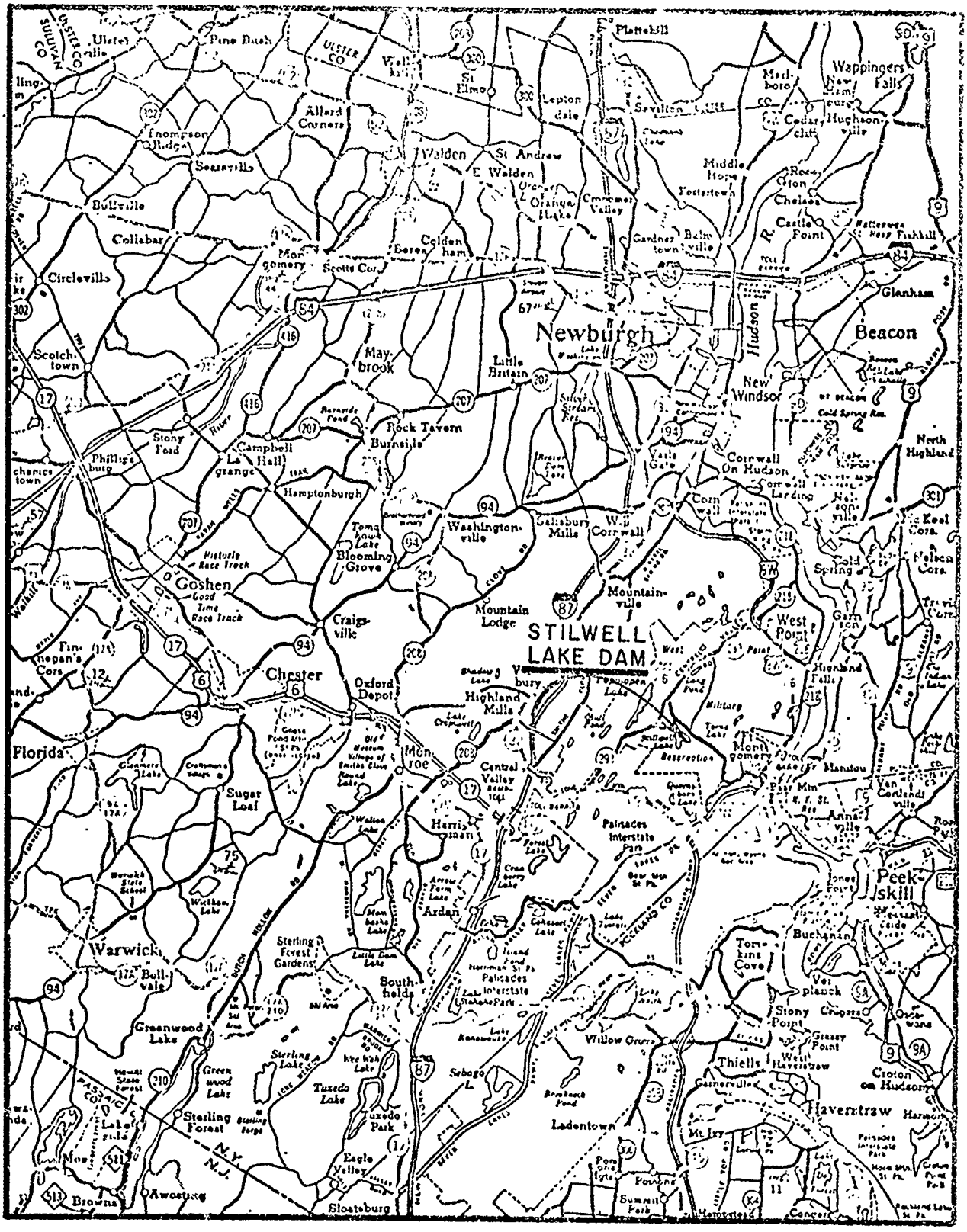
c. Establish an observatio . and monitoring program of the pattern and quantity occurring on the downstream side of the gallery wall.

d. Establish a program of periodic inspections of the project features.

e. Prepare an Operation and Maintenance Manual.

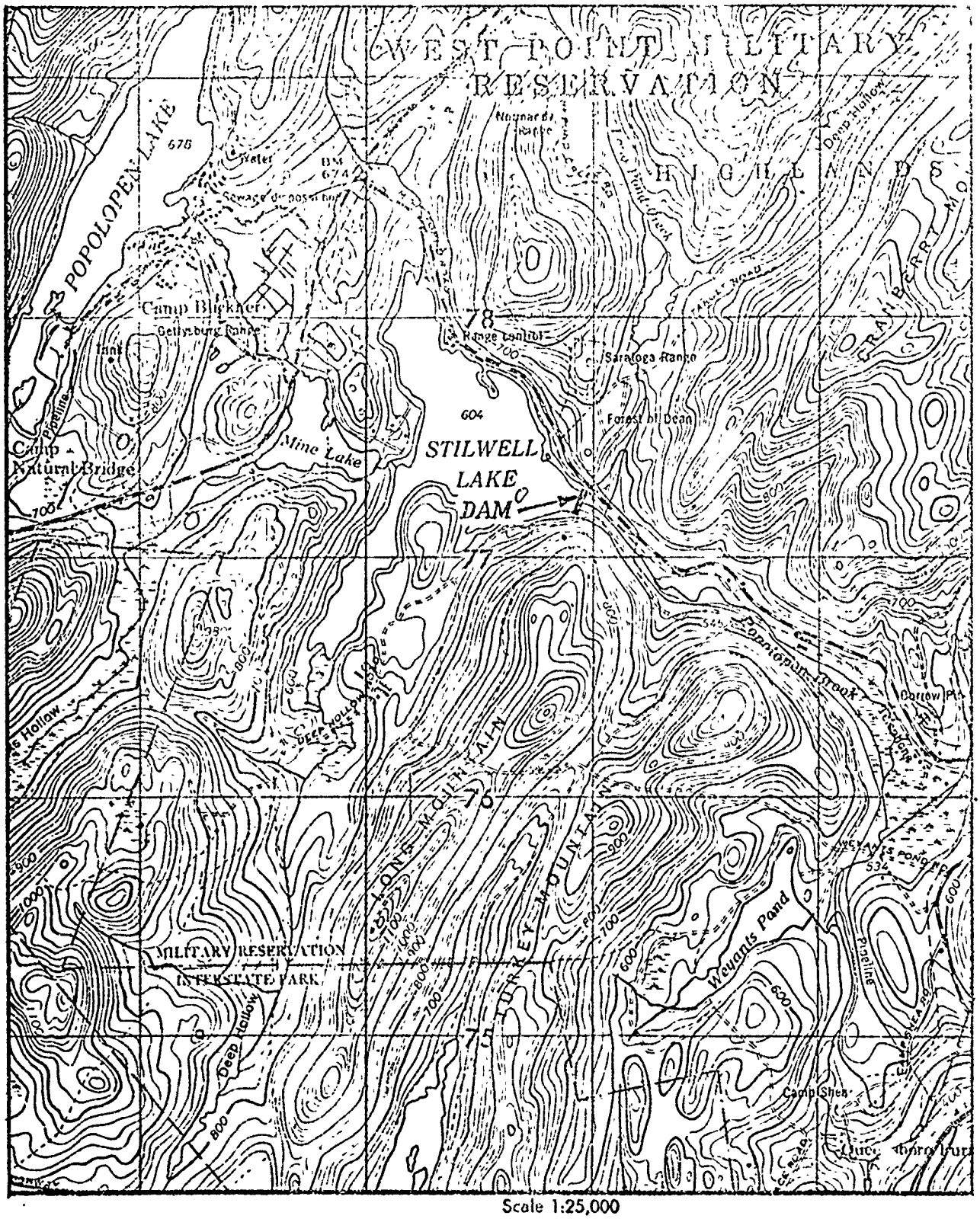
DRAWINGS

APPENDIX A



VICINITY MAP
STILWELL LAKE DAM

SCALE OF MILES

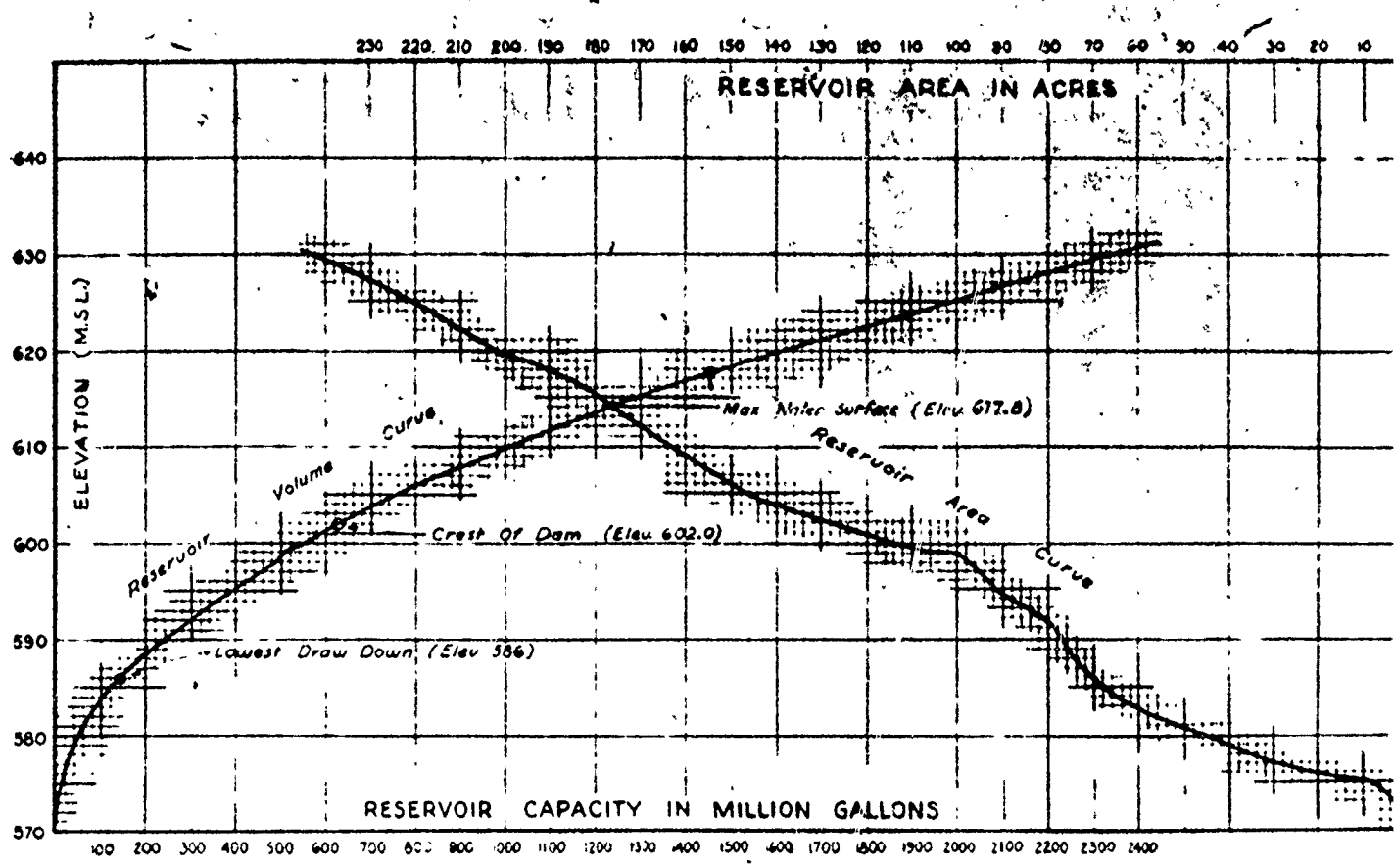


TOPOGRAPHIC MAP
STILWELL LAKE DAM

STILWELL LAKE DAM LIST OF DRAWINGS

7512-461	GENERAL LOCATION PLAN
7512-462	RESERVOIR
7512-464	HYDROLOGIC & DESIGN DATA
7512-465.1 .	GENERAL PLAN OF DAM
7512-466	PLAN OF SPILLWAY AND BUCKET SECTIONS
7512-467	SPILLWAY SECTIONS & ELEVATION OF DAM
7512-468	NON-OVERFLOW SECTIONS & SPRAY WALL
7512-469.1	INTAKE AND DRAW-OFF DETAILS
7512-470	GROUTING GALLERY AND PLANT
7512-471	WATER STOPS, BLOW-OFF & MISCELLANEOUS DETAILS
7512-472	MISCELLANEOUS DAM APPURTENANCES

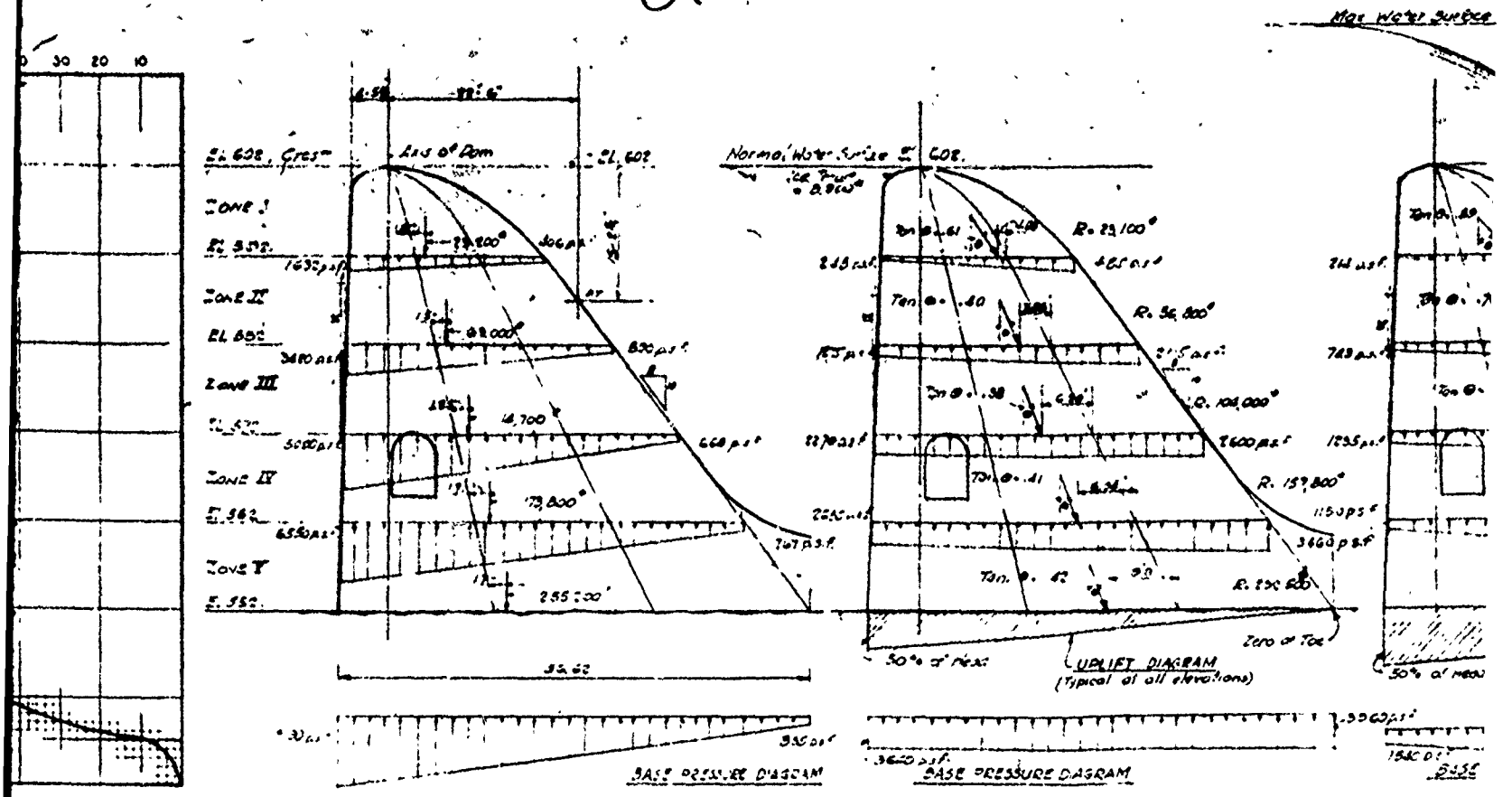
WAR DEPARTMENT



RESERVOIR VOLUME-AREA CURVES

RAINFALL DATA

2



CASE I RESERVOIR EMPTY

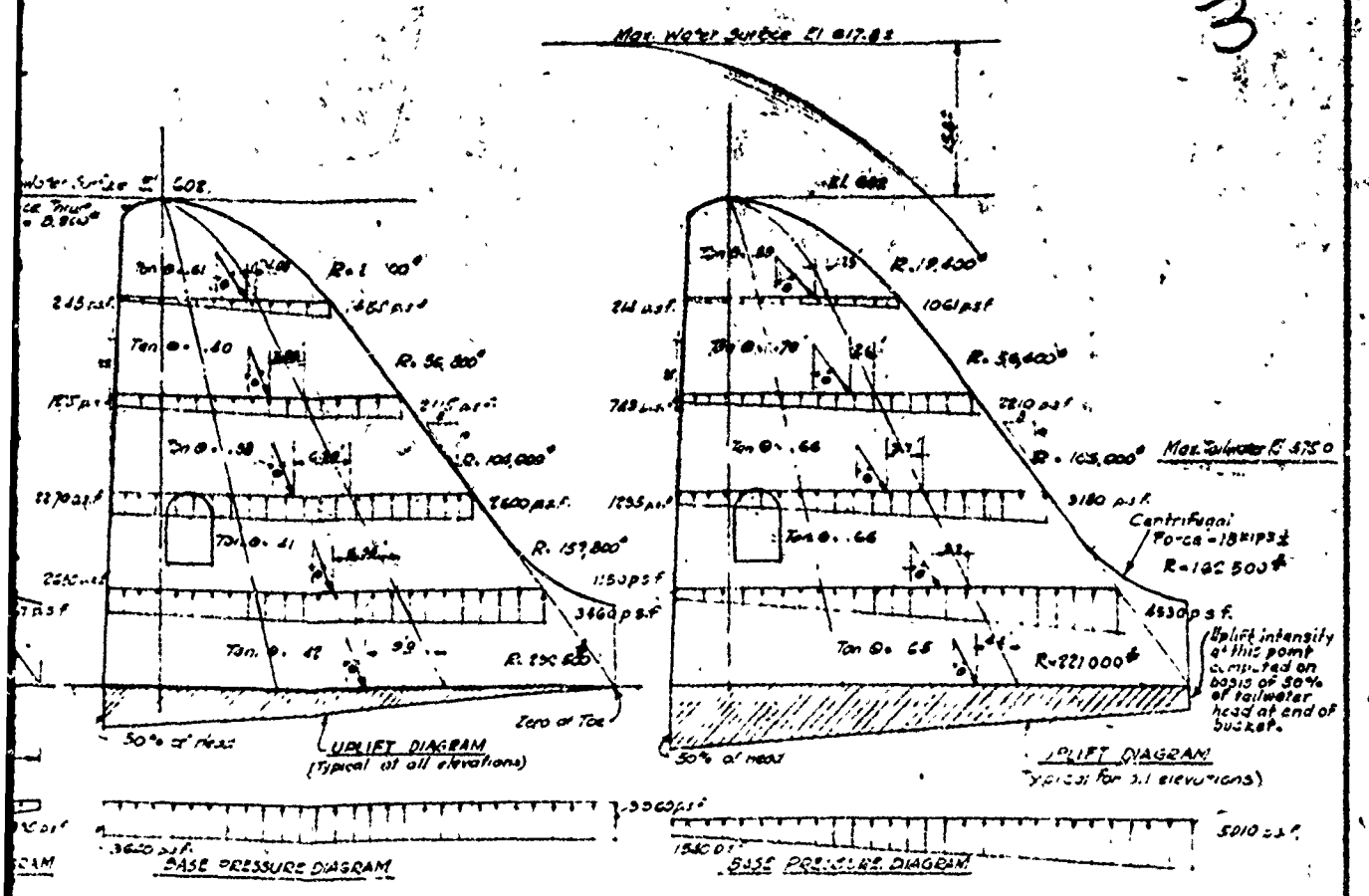
CASE II - RESERVOIR FULL TO CREST & ICE THRUST

CAS

SPILLWAY SECTION

CORPS OF ENGINEERS, U.S. ARMY

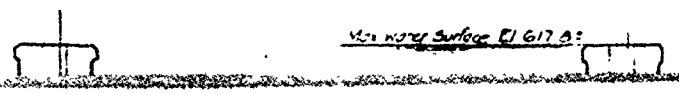
3



CASE II - RESERVOIR FULL TO CREST & ICE THRUST

CASE III RESERVOIR FULL TO MAX FLOOD LEVEL PLUS UPSTREAM DAM FAILURE.

SPILLWAY SECTION



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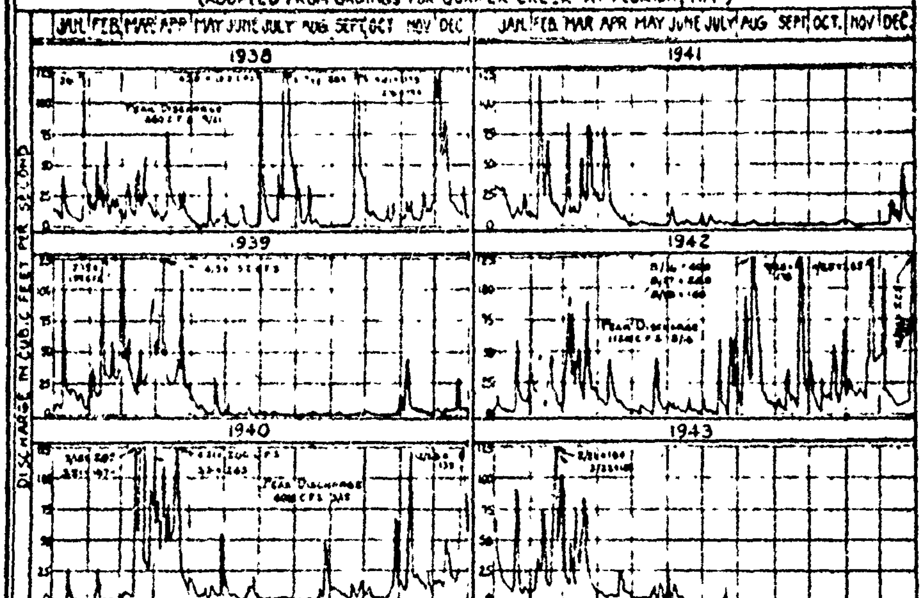
FEBRUARY	8	3.78	2.88	5.12	4.68	1.97	7.29	2.34	.60	4.46	3.35	[illegible]	3.73			.20	2.25	2.40	4.3	12 3.56	12 3.07	8 [illegible]	9 4.32	8 2.30	[illegible] 3.49	[illegible]
MARCH	9	3.42	1.30	4.91	2.83	4.15	3.34	.33	1.10	12.02	3.35	2.49	7.45			3.80	2.30	.55	3.09	6 1.5[illegible]	12 4.32	11 6.4[illegible]	14 3.32	11 4.93	8 0.12	[illegible]
APRIL	9	2.68	4.56	3.90	2.70	1.39	3.6	2.80	6.81	1.95	3.17	[illegible]	1.70		2.53	4.45	3.18	2.39	5.83	11 3.45	7 3.90	14 3.99	[illegible] 3.14	4 3.75	7 2.18	[illegible]
MAY	9	4.72	2.00	5.07	1.90	4.84	5.24	4.45	3.35	2.89	4.70	7.51	2.31		1.80	4.71	3.4	7.59	1.83	13 5.60	8 0.5[illegible]	13 4.74	9 4.11	4 [illegible]	11 3.33	[illegible]
JUNE	8	1.04	3.32	4.60	2.46	3.61	.83	2.28	2.63	4.37	3.20	1.95	4.85		3.83	2.75	3.37	2.48	4.46	10 4.77	12 6.01	6 1.56	7 1.34	9 4.7[illegible]	9 2.99	[illegible]
JULY	9	7.18	3.32	7.00	4.16	5.97	4.53	1.04	6.86	2.58	13.03	3.80	5.78		4.51	3.55	2.21	4.11	2.00	10 1.87	8 2.97	9 2.52	9 .96	11 4.87	14 6.29	[illegible]
AUGUST	8	6.40	4.09	4.10	4.86	3.47	6.62	1.86	3.42	.96	3.15	[illegible]	1.90		4.00	1.80	0.82	4.35	4.35	8 3.81	11 7.10	13 [illegible]	8 4.03	12 2.34	14 6.33	[illegible]
SEPTEMBER	7	[illegible]	6.42	6.80	1.66	3.33	2.84	6.30	1.10	5.74	2.90	1.37	6.39		5.30	2.83	10.68	1.50	2.37	10 2.45	18 4.50	14 3.35	7 6.32	6 1.09	9 .25	[illegible]
OCTOBER	7	[illegible]	4.85	4.30	0.93	7	4.25	[illegible]	4.22	2.36	1.43	4.02	1.64		3.00	4.10	7.51	1.70	0.69	8 1.35	11 6.49	14 3.38	12 8.6[illegible]	[illegible] 2.19	9 2.28	[illegible]
NOVEMBER	8	---	8.08	.20	2.83	6.02	3.03	4.90	3.98	3.10	3.43	[illegible]	3.34		1.80	1.45	4.41	0.67	2.37	10 4.46	12 3.37	10 3.01	10 2.4[illegible]	11 4.31	13 [illegible]	[illegible]
DECEMBER	7	4.42	1.36	--	3.03	1.33	1.66	2.92	4.20	1.63	5.60	2.4	2.23		2.39	4.40	3.90	2.70	4.59	11 2.4[illegible]	11 1.50	11 5.40	8 [illegible]	11 2.13	11 5.4	[illegible]
Annual	97		52.76		42.26	42.2	51.52	42.20	46.2	45.54	54.13	[illegible]	44.72			[illegible]	46.34	33.41	38.30	125 45.87	127 [illegible]	134 [illegible]	117 [illegible]	[illegible]	[illegible] 41.48	[illegible]

	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930
JANUARY	11 .12	8 2.61	11 .42	9 2.26	8 2.21	15 3.30	[illegible] 3.12	12 2.22	11 2.41	12 3 [illegible]	12 .91	14 1.52	13
FEBRUARY	11 .134	9 .97	11 2.43	10 4.83	10 3.38	11 2.40	10 2.33	8 4.75	11 4.16	16 3.48	11 4.00	10 4.40	18
MARCH	7 .127	12 4.18	10 4.30	14 2.80	1 5.60	11 2.33	7 0.93	11 5.17	18 1.48	9 2.36	13 1.77	14 2.04	12 -
APRIL	[illegible] 3.54	13 4.76	13 4.40	13 3.94	10 2.30	9 .89	11 5.37	8 1.66	11 [illegible]	8 2.06	12 4.15	17 2.25	9 2.97
MAY	12 3.55	15 4.30	[illegible] 1.63	7 1.84	[illegible] 2.10	8 2.50	15 3.65	1 1.90	7 0.72	16 3.49	9 .32	13 2.51	13 2.69
JUNE	9 1.54	7 3.83	1 5.31	8 3.07	14 [illegible]	9 3.20	10 2.25	3 1.89	12 1.36	9 1.65	[illegible] 6.22	9 .98	10 3.10
JULY	10 3.45	10 7.21	12 3.30	9 4.40	9 3.34	8 1.54	9 2.31	[illegible] 4.64	9 2.74	13 3.27	12 7.30	16 3.98	13 1.35
AUGUST	8 2.90	1 4.34	11 4.53	7 2.43	11 1.20	7 0.78	10 3.6	6 .22	13 4.88	11 7.38	13 7.24	8 1.24	9 2.41
SEPTEMBER	14 2.37	10 4.59	9 2.73	9 4.40	6 2.85	9 5.33	3 3.33	12 3.33	10 2.30	6 4.38	10 2.50	9 2.79	9 1.12
OCTOBER	11 0.90	14 2.37	[illegible] 3.73	10 2.95	8 1.50	8 3.34	2 3.00	4 2.82	14 3.99	10 6.89	11 1.43	10 4.11	7 1.38
NOVEMBER	9 2.10	11 [illegible]	2 3.47	6 5.38	9 .25	9 3.25	7 3.40	[illegible]	11 3.73	15 5.83	12 2.41	3 2.37	9 4.36
DECEMBER	12 4.44	11 3.71	1 1.39	9 3.40	10 .94	13 2.35	2 2.52	11 .25	1 2.96	13 5.44	8 1.88	14 4.20	11 1.46
Annual	124 31.43	129 30.54	125 [illegible]	118 [illegible]	[illegible] 34.14	[illegible] 1.91	118 39.14	133 [illegible]	[illegible] 30.30	[illegible] 53.37	138 41.13	[illegible] 29.40	122 -

	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	194[illegible]
JANUARY	1 .47	8 3.51	8 1.72	13 3.31	14 1.64	14 5.39	13 6.03	13 3.41	4 3.12	12 [illegible]	14 .98	12 3.97	[illegible]
FEBRUARY	13 .81	13 2.43	12 2.90	9 2.86	12 2.37	9 2.90	9 2.31	11 2.40	12 4.02	12 2.58	9 2.49	13 .91	[illegible]
MARCH	9 2.36	13 4.80	14 4.99	12 4.31	11 2.26	16 .90	13 2.30	13 1.62	16 3.95	15 .30	10 2.10	13 5.35	[illegible]
APRIL	13 4.93	10 2.41	13 5.22	12 3.60	12 2.49	10 2.90	10 4.59	12 3.53	15 [illegible]	12 6.06	7 .48	13 1.72	[illegible]
MAY	18 4.17	8 -	12 2.20	7 3.31	9 1.62	10 3.00	13 5.49	11 4.31	7 1.41	15 4.67	9 2.00	13 4.02	[illegible]
JUNE	9 3.69	11 ---	8 1.23	9 3.35	14 2.35	6 3.08	12 5.27	10 5.33	11 3.03	14 3.21	9 5.37	11 4.31	[illegible]
JULY	12 2.38	12 3.03	5 2.41	4 3.90	13 3.70	5 2.75	9 3.96	13 7.72	9 2.47	11 [illegible]	11 6.06	12 7.23	[illegible]
AUGUST	10 2.94	10 3.35	12 14.07	9 2.33	10 1.70	11 3.25	11 6.32	10 4.91	8 3.14	8 2.89	4 3.57	8 4.99	[illegible]
SEPTEMBER	11 1.82	8 1.73	11 5.02	12 4.17	9 3.10	9 3.43	9 4.67	14 10.70	11 3.46	9 2.81	6 0.42	11 4.18	[illegible]
OCTOBER	12 1.35	12 2.30	8 1.58	9 3.35	10 .77	13 3.67	14 3.21	8 .93	14 [illegible]	9 [illegible]	1 2.33	13 3.38	[illegible]
NOVEMBER	11 0.71	10 4.30	14 0.86	14 3.14	10 3.78	12 1.32	14 3.29	11 2.83	8 [illegible]	15 4.1	10 2.90	4 4.22	[illegible]
DECEMBER	2 2.30	11 .51	13 9.39	12 2.30	3 0.80	11 6.04	11 2.48	14 4.30	13 2.00	14 2.[illegible]	[illegible] 3.93	4 5.[illegible]	[illegible]
Annual	129 30.31	13 [illegible]	14 44.42	127 [illegible]	139 [illegible]	[illegible] 46.13	146 53.00	138 52.35	136 41.56	146 41.79	121 34.31	[illegible]	[illegible]

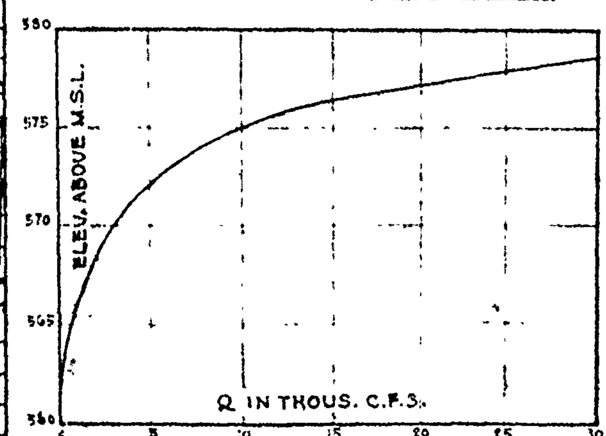
NOTE: Rainfall data prior to 1888 available at U.S. Weather Bureau.

HYDROGRAPH
(ADOPTED FROM GAGINGS FOR QUAKER CREEK AT FLORIDA, N.Y.)



WEST POINT
AVERAGE TEMPERATURES THROUGH 1930

	Length of Record	January	February	March	April	May	June	July	August	Sept.	October	Nov.	Dec.	Annual
Maximum	32	34.9	35.1	40.[illegible]	59.8	71.5	80.5	84.8	82.5	75.5	62.6	50.1	39.9	62.5
Minimum	33	19.1	18.7	27.6	38.2	42.4	57.8	62.4	60.1	54.3	44	34.3	23.7	48.8



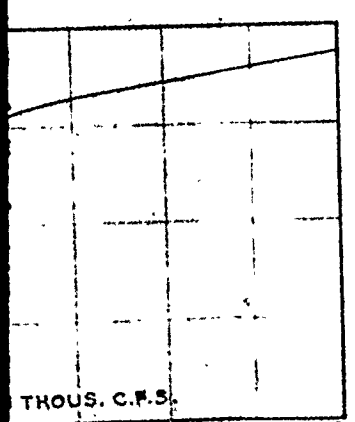
APPROX. RATING CURVE AT DAM SITE
(Curve applies to existing condition at ℄ of dam.)

	1911	1912	1913	1914	1915	1916	1917
E							
P							

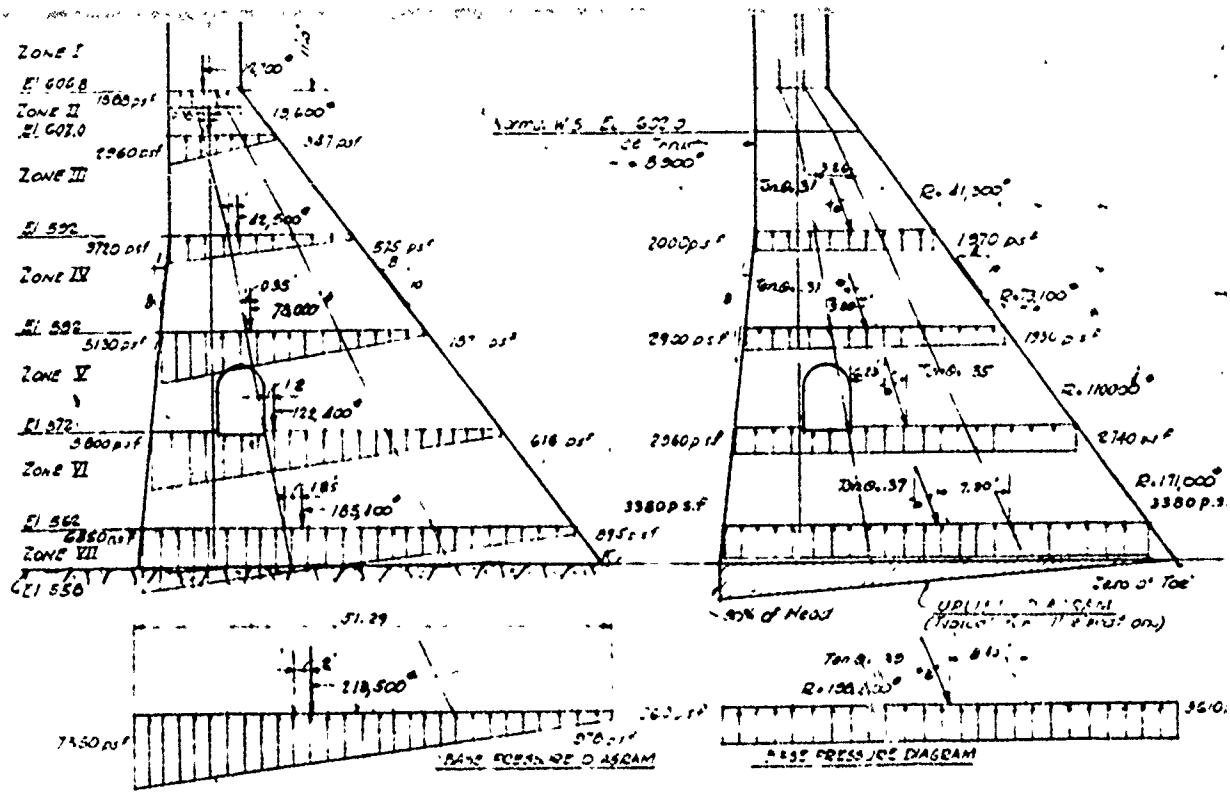
	1938	1939	1940	1941	1942	1943	1944
E							
P							

ST POINT
ATURES THROUGH 1930

	MAY	JUNE	JULY	AUGUST	SEPT.	OCTOBER	NOV	DEC.	ANNUAL



CURVE AT DAM SITE
ring condition at ℄ of dam.)



CASE I RESERVOIR EMPTY

CASE II RESERVOIR FULL TO CREST & ICE TH

NON — OVERFLOW SECTION

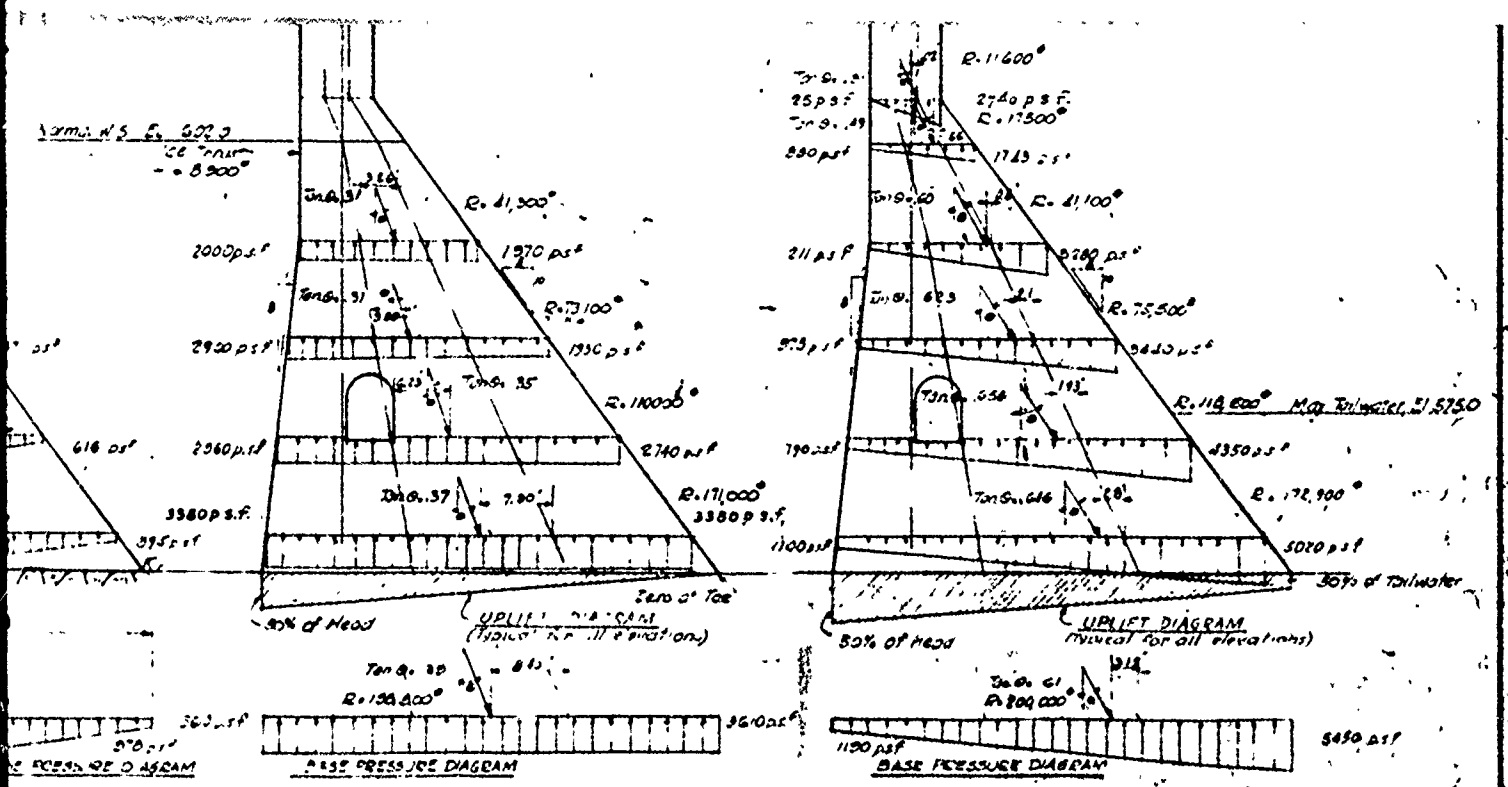
RECORD DRAWING
OF WORK - AS - BUILT

Jas Comey
Contracting Officer
19 November 1949

CONT NO W 30 075 ENG 2846

WORK	1	RECORD WORK AS BUILT		J
DATE	REV NO.	REVISIONS	REV BY	APP

5



CASE II RESERVOIR FULL TO CREST & ICE THRUST

CASE III RESERVOIR FULL TO MAX FLOOD LEVEL PLUS UPSTREAM DAM FAILURE

NON — OVERFLOW SECTION

DC TM 703-8 MAY 45

UNITED STATES MILITARY ACADEMY

WATER SUPPLY DAM & RESERVOIR

HYDROLOGIC AND DESIGN DATA

POPOLOPEN — WEST POINT, N.Y.

IN 31 SHEETS — SCALES AS SHOWN — SHEET NO 4

U.S. ENGINEER OFFICE NEW YORK DISTRICT NEW YORK, N.Y. 1945

Recommended F. L. Parsons, Chief of Engineers — Approved Lt. Col. Corps of Engineers — Colonel, Corps of Engineers

Submitted [illegible] Architect-Engineers

6

To Accompany Specifications Dated 8 June 1945

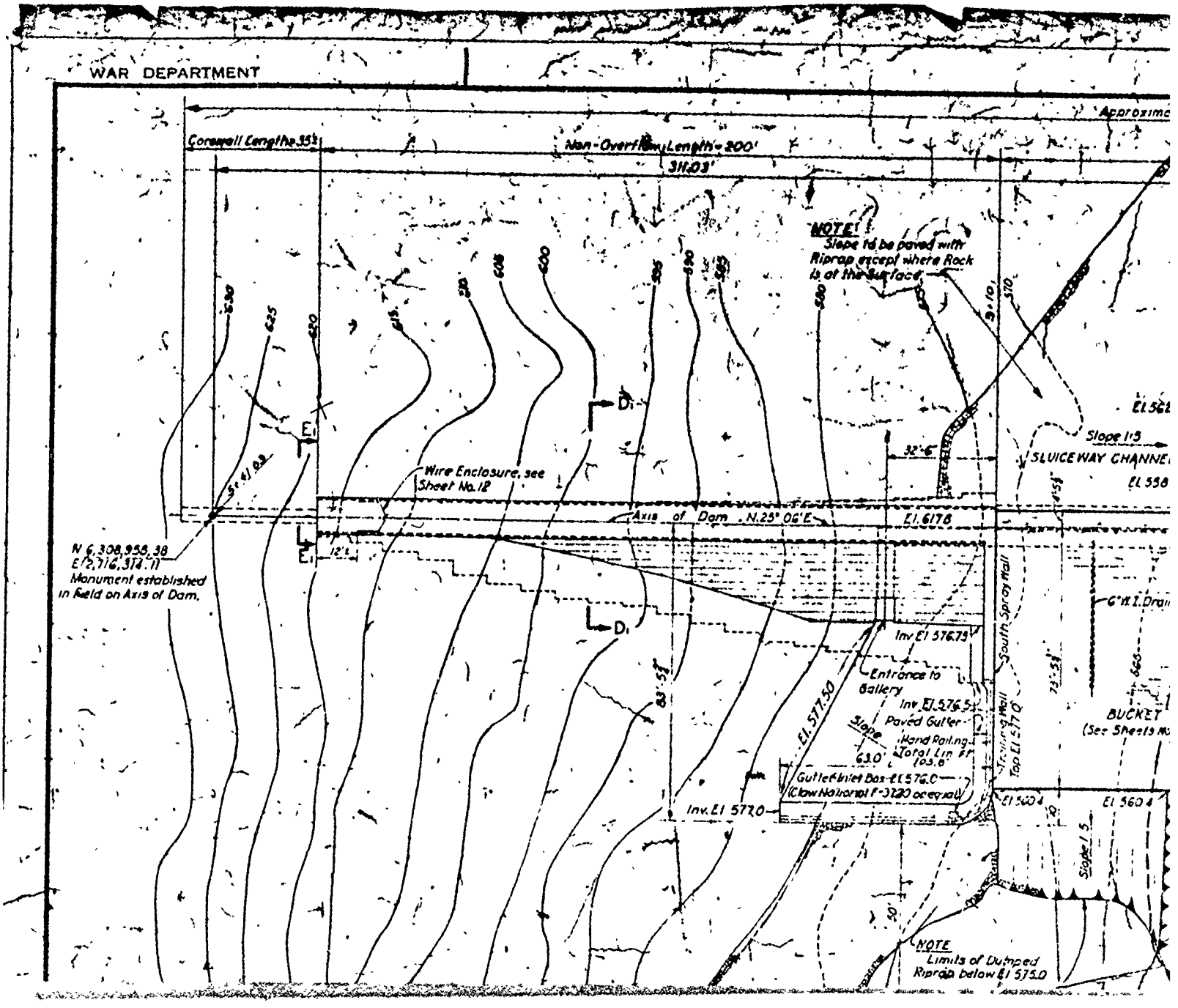
7512 - 464

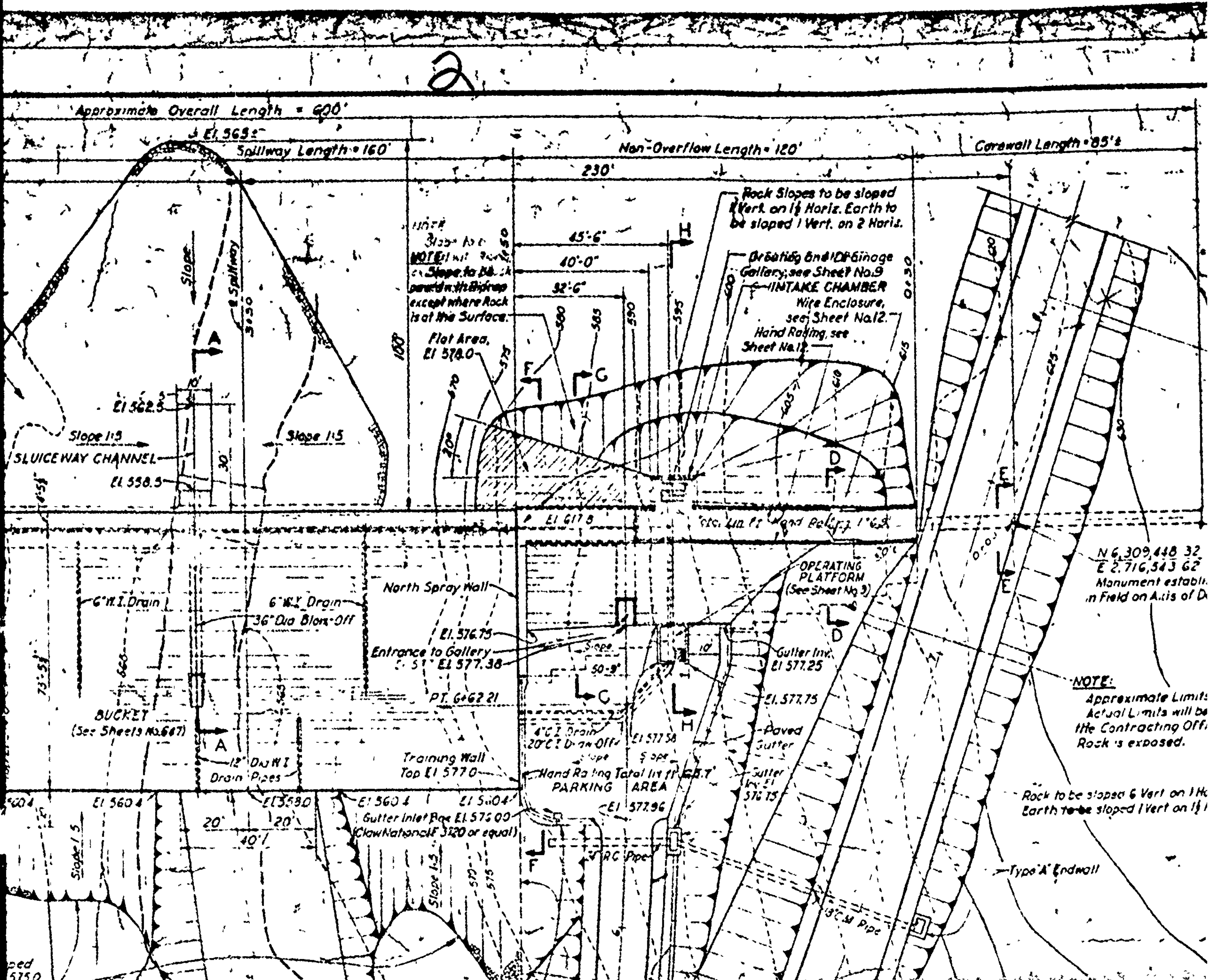
ORD DRAWING
WORK - AS - BUILT

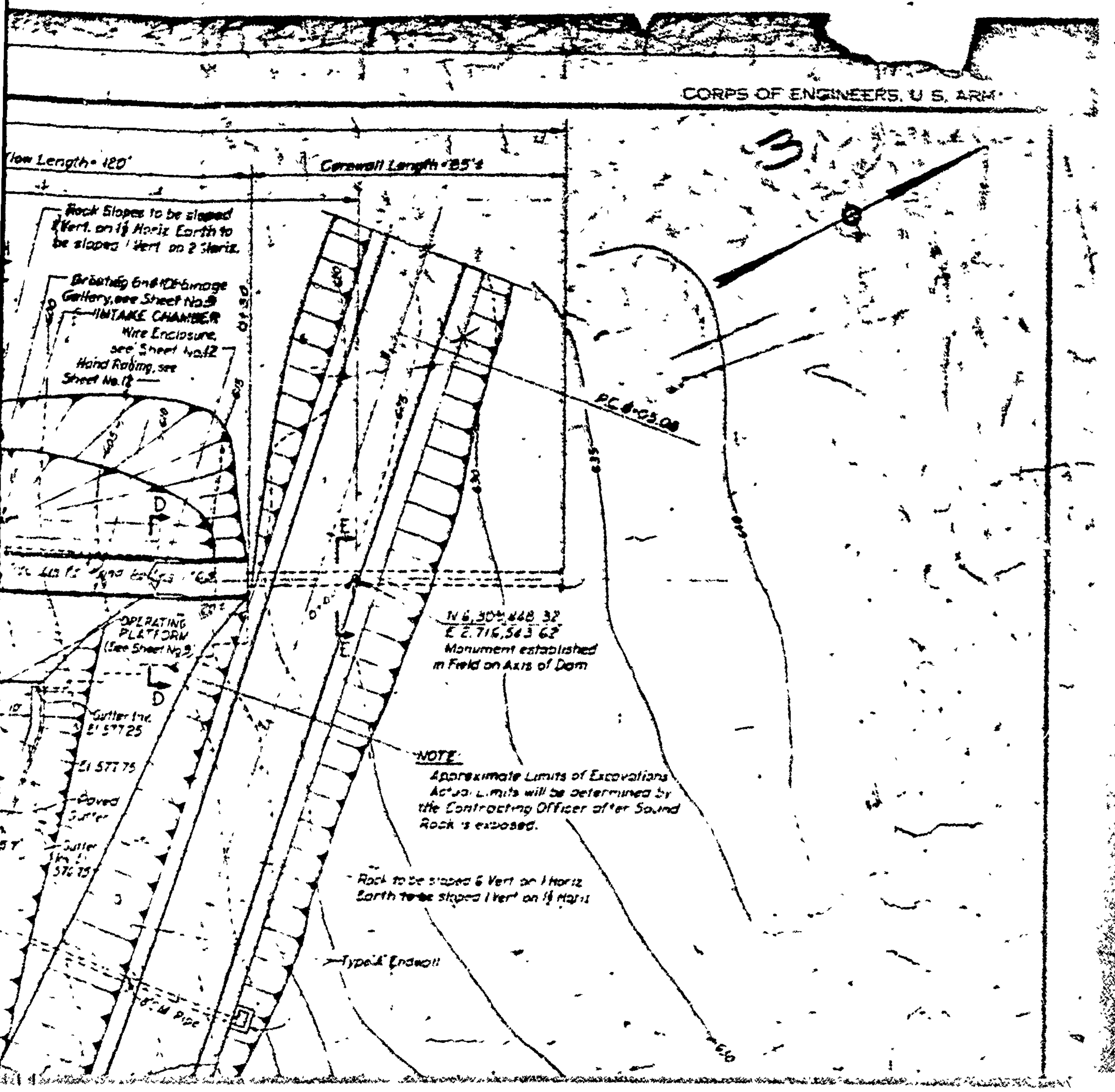
Contracting Officer
19 November 1948

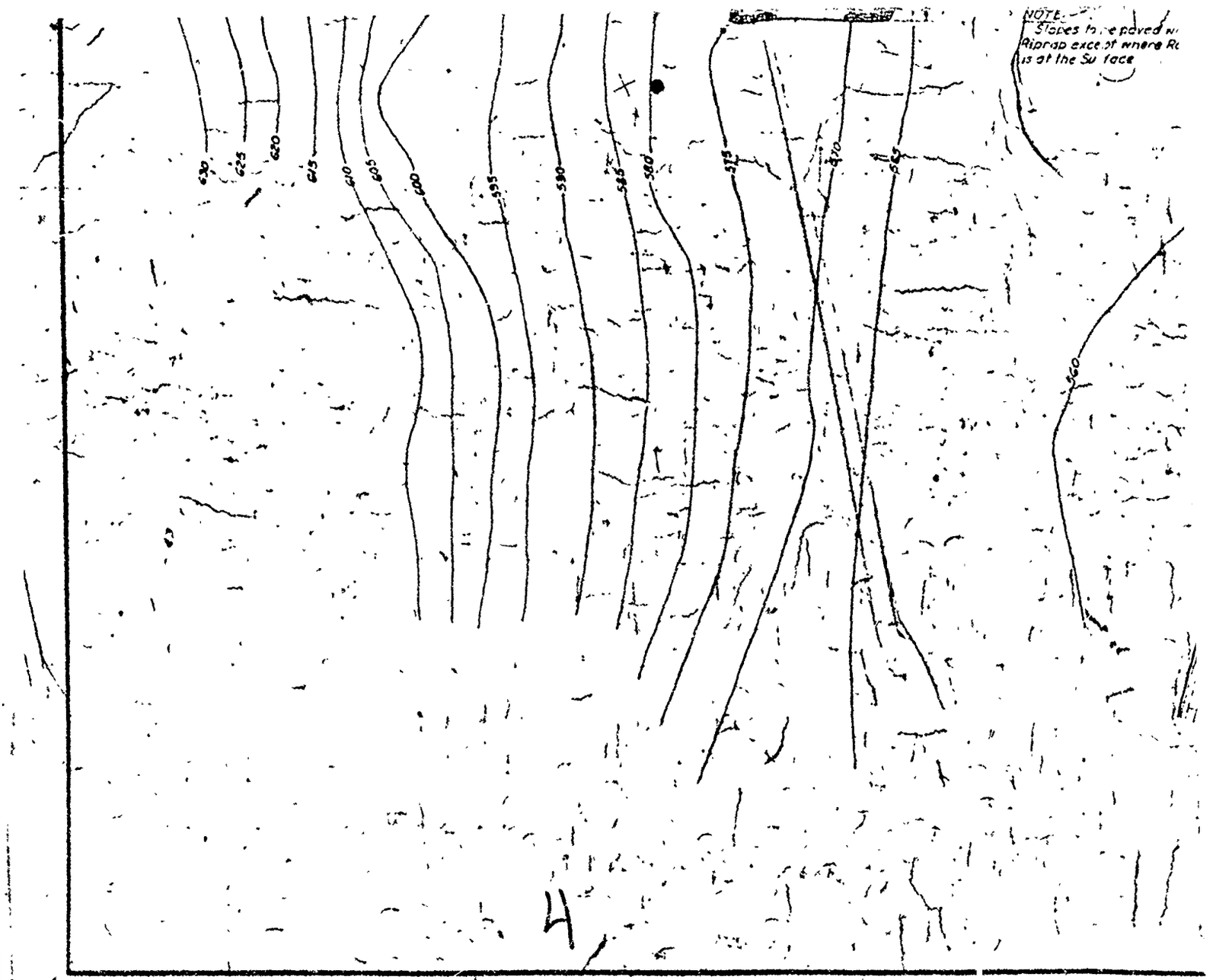
CONT NO W 30 075 ENG 2846

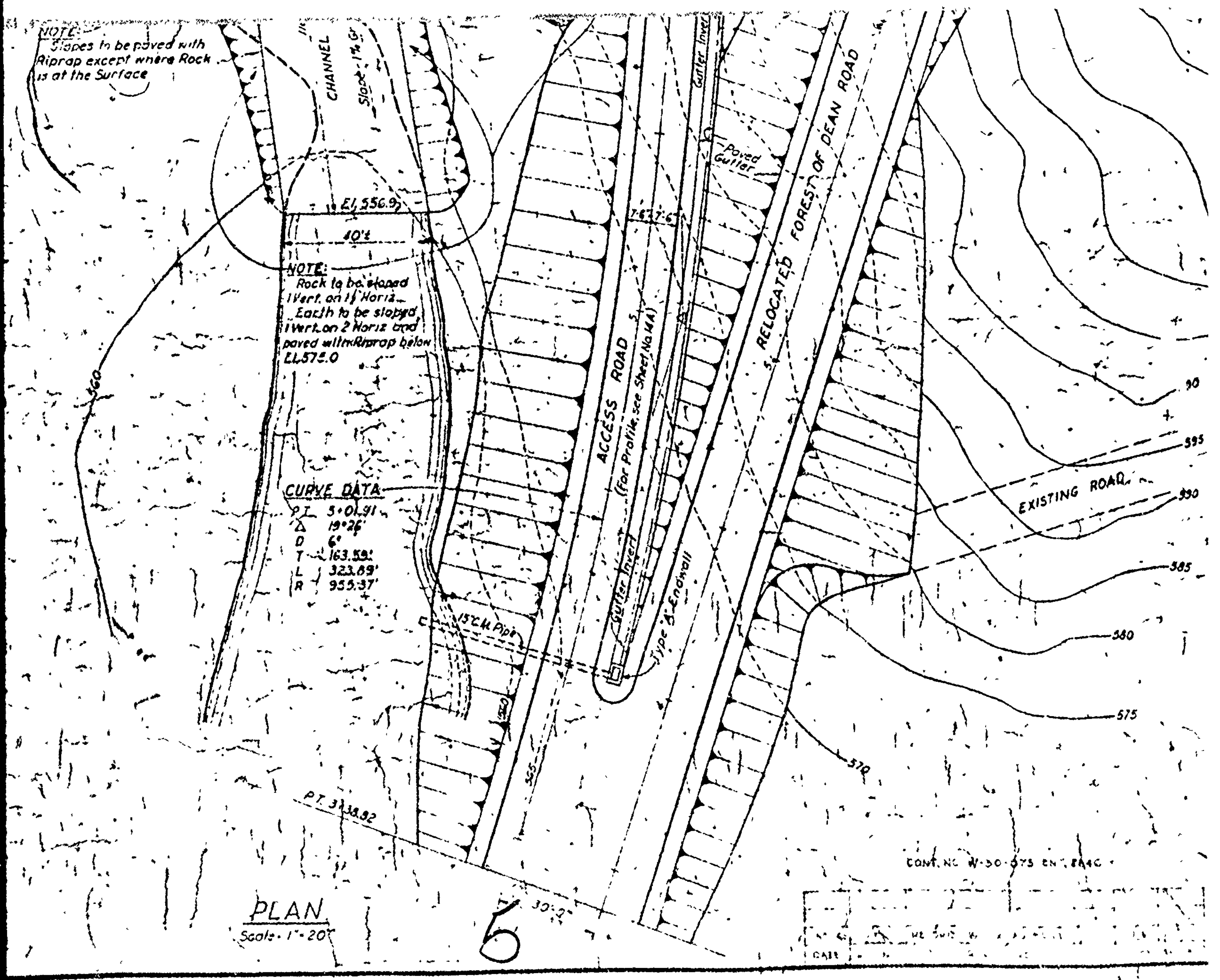
NO 48	1	RECORD WORK AS BUILT		
DATE	REV NO.	REVISIONS	REV BY	APP BY

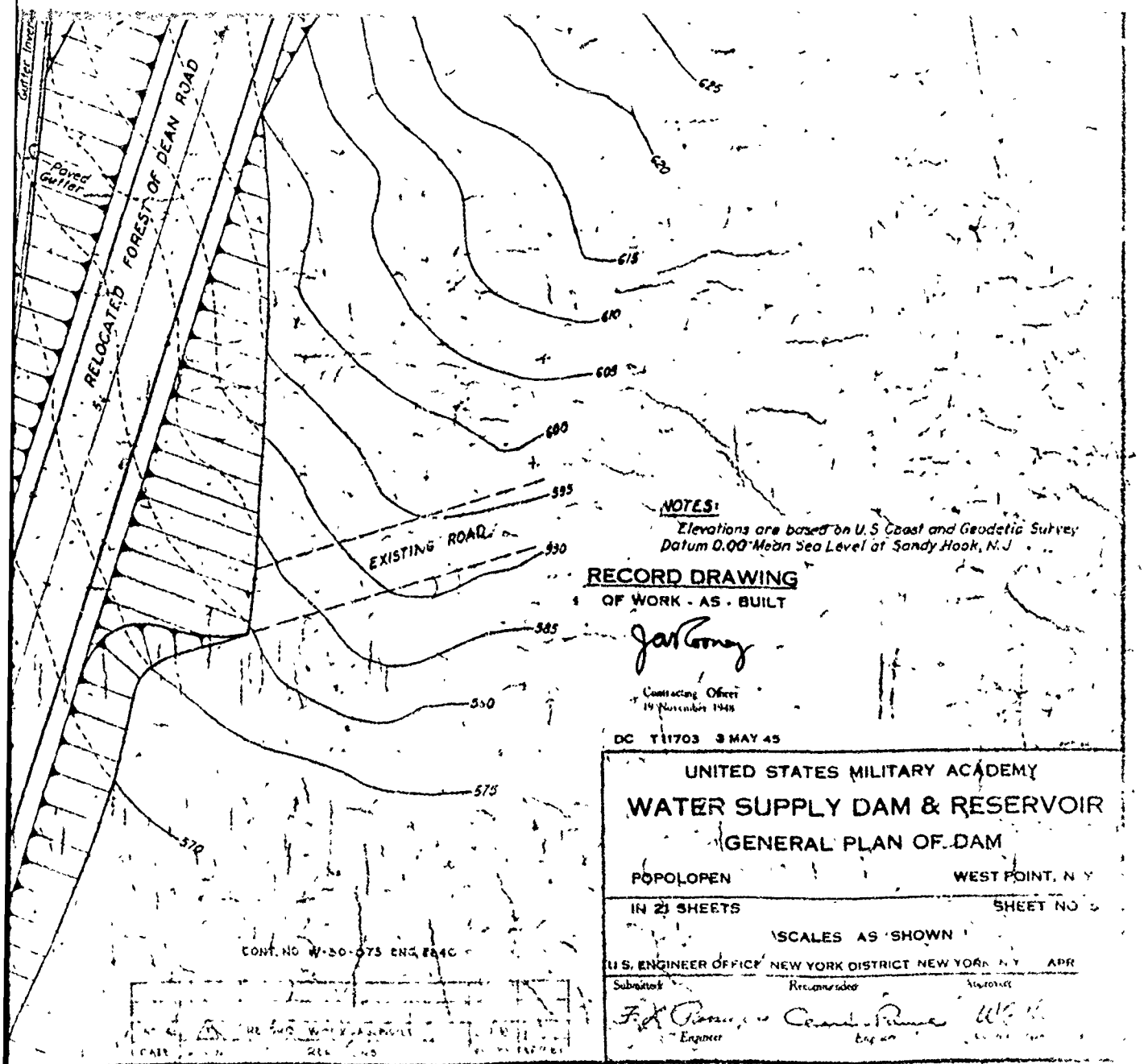

WAR DEPARTMENT
Approximate
Corewall Length=353'
Non-Overflow Length=200'
311.03'
NOTE!
Slope to be paved with Riprap except where Rock is at the Surface
Slope 1:3
SLUICEWAY CHANNEL
El. 558
El. 561
Wire Enclosure, see Sheet No. 12
Axis of Dam N.25° 06'E
El. 617.8
N 6,308,958.38
E 12,716,314.11
Monument established in field on Axis of Dam.
Inv. El 576.75
Entrance to Gallery
Inv. El. 576.5±
Paved Gutter
Hand Railing
Total Lin. Ft. 103.6
Slope
63.0'
El. 577.50
Gutter Inlet Box El. 576.0
(Clow National F-3120 or equal)
Inv. El 577.0
South Spray Wall
Top El 577.0
BUCKET
(See Sheet No.
El 560.4
El 560.4
Slope 1:5
NOTE
Limits of Dumped Riprap below El 575.0


2
Approximate Overall Length = 600'
Spillway Length = 160'
Non-Overflow Length = 120'
Corewall Length = 85'±
230'
Rock Slopes to be sloped 1 Vert. on 1½ Horiz. Earth to be sloped 1 Vert. on 2 Horiz.
45'-6"
40'-0"
32'-6"
Gallery; see Sheet No. 9
INTAKE CHAMBER
Wire Enclosure, see Sheet No. 12.
Hand Railing, see Sheet No. 12.
Slope to be
except where Rock is at the Surface.
Flat Area, El 578.0
El 562.5
Slope 1:5
SLUICEWAY CHANNEL
El 558.5
North Spray Wall
6" W.I. Drain
36" Dia Blow-Off
El. 576.75
Entrance to Gallery
El 577.38
PT. 6+62.21
BUCKET
(See Sheets No. 6 & 7)
12" Dia W.I. Drain Pipes
Training Wall Top El 577.0
PARKING AREA
OPERATING PLATFORM (See Sheet No. 9)
Gutter Inv. El 577.25
El. 577.75
Paved Gutter
El 577.96
El 560.4
El 558.0
20'
40'
Gutter Inlet Box El. 575.00 (Clow National F 3120 or equal)
R.C. Pipe
Type 'A' Endwall
C.M. Pipe
N 6,309,448.32
E 2,716,543.62
Monument established in Field on Axis of D
NOTE:
Approximate Limits
Actual Limits will be
the Contracting Offi
Rock is exposed.
Rock to be sloped 6 Vert on 1 Ho
Earth to be sloped 1 Vert on 1½
Slope 1:5
575.0


CORPS OF ENGINEERS, U. S. ARM
Corewall Length • 85'±
Rock Slopes to be sloped 6 Vert. on 1½ Horiz. Earth to be sloped 1 Vert. on 2 Horiz.
INTAKE CHAMBER
Wire Enclosure, see Sheet No.12
Hand Railing, see Sheet No.12
OPERATING PLATFORM (See Sheet No.9)
P.C. 6+05.08
Monument established in Field on Axis of Dam
NOTE
Approximate Limits of Excavations. Actual Limits will be determined by the Contracting Officer after Sound Rock is exposed.
Rock to be sloped 6 Vert on 1 Horiz. Earth to be sloped 1 Vert on 1½ Horiz.
Type A Endwall
Paved Gutter


NOTE
Slopes to be paved w
Riprap except where R
is at the Surface
630
625
620
615
610
605
600
595
590
585
580
575
570
565
560


NOTE:
Slopes to be paved with Riprap except where Rock is at the Surface
CHANNEL
Slope - 1% Gr.
El. 556.9
40'±
NOTE:
Rock to be sloped 1 Vert. on 1½ Horiz.
Earth to be sloped 1 Vert. on 2 Horiz. and paved with Riprap below El. 575.0
CURVE DATA
P.I. 5+01.91
Δ 19°26'
D 6°
T 163.59'
L 323.89'
R 955.37'
15" C.M. Pipe
ACCESS ROAD
(For Profile, see Sheet No. 4A)
Gutter Invert
Paved Gutter
Type "A" Endwall
RELOCATED FOREST OF DEAN ROAD
EXISTING ROAD
590
595
585
580
575
570
560
P.T. 3+38.92
PLAN
Scale - 1" = 20'
6



NOTES:
Elevations are based on U.S. Coast and Geodetic Survey Datum 0.00 Mean Sea Level at Sandy Hook, N.J.

RECORD DRAWING
OF WORK - AS - BUILT

Jas Gray
Contracting Officer
19 November 1948

DC T11703 3 MAY 45

UNITED STATES MILITARY ACADEMY

WATER SUPPLY DAM & RESERVOIR

GENERAL PLAN OF DAM

POPOLOPEN — WEST POINT, N.Y.

IN 21 SHEETS — SHEET NO 6

SCALES AS SHOWN

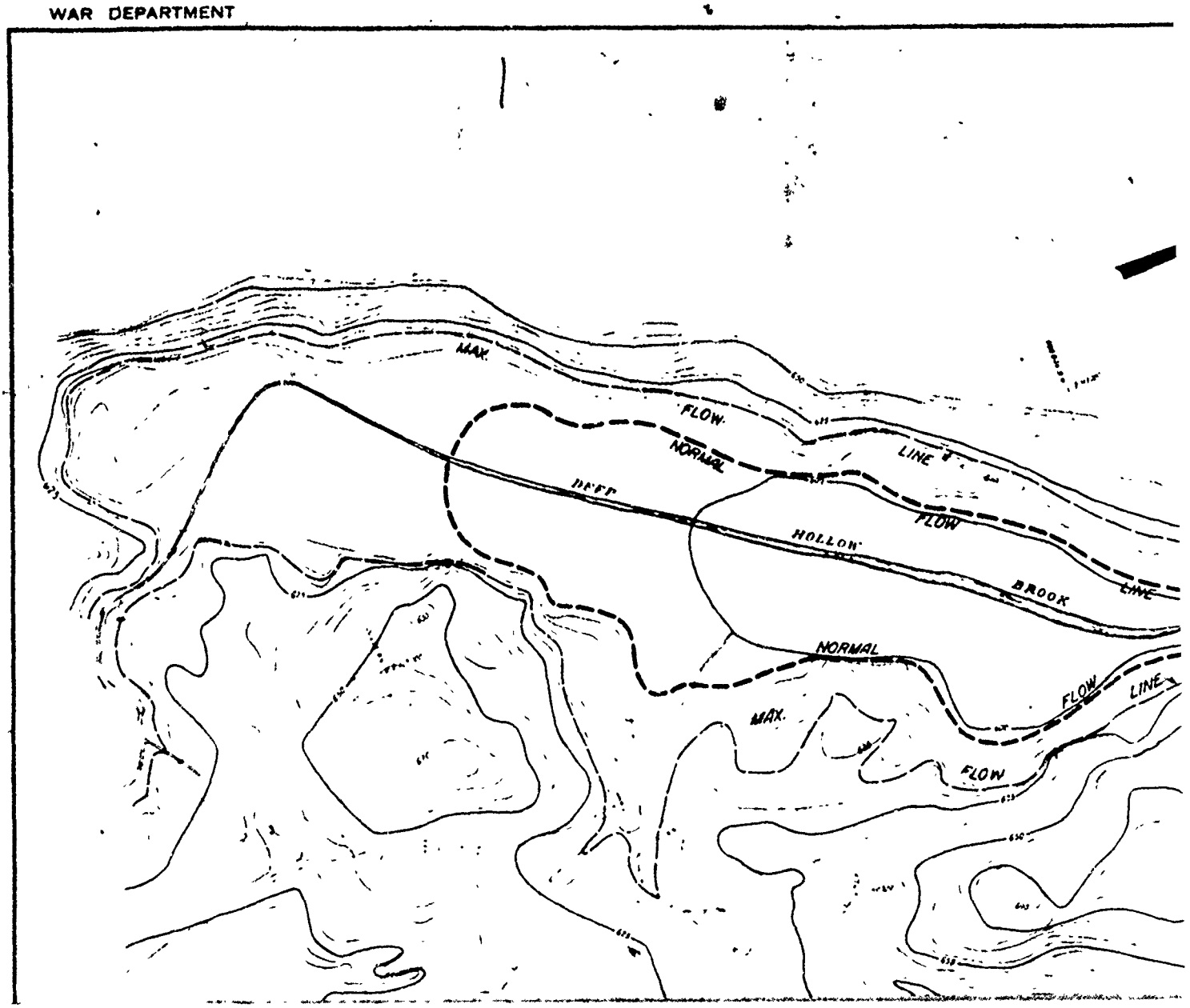
U.S. ENGINEER OFFICE NEW YORK DISTRICT NEW YORK, N.Y. APR

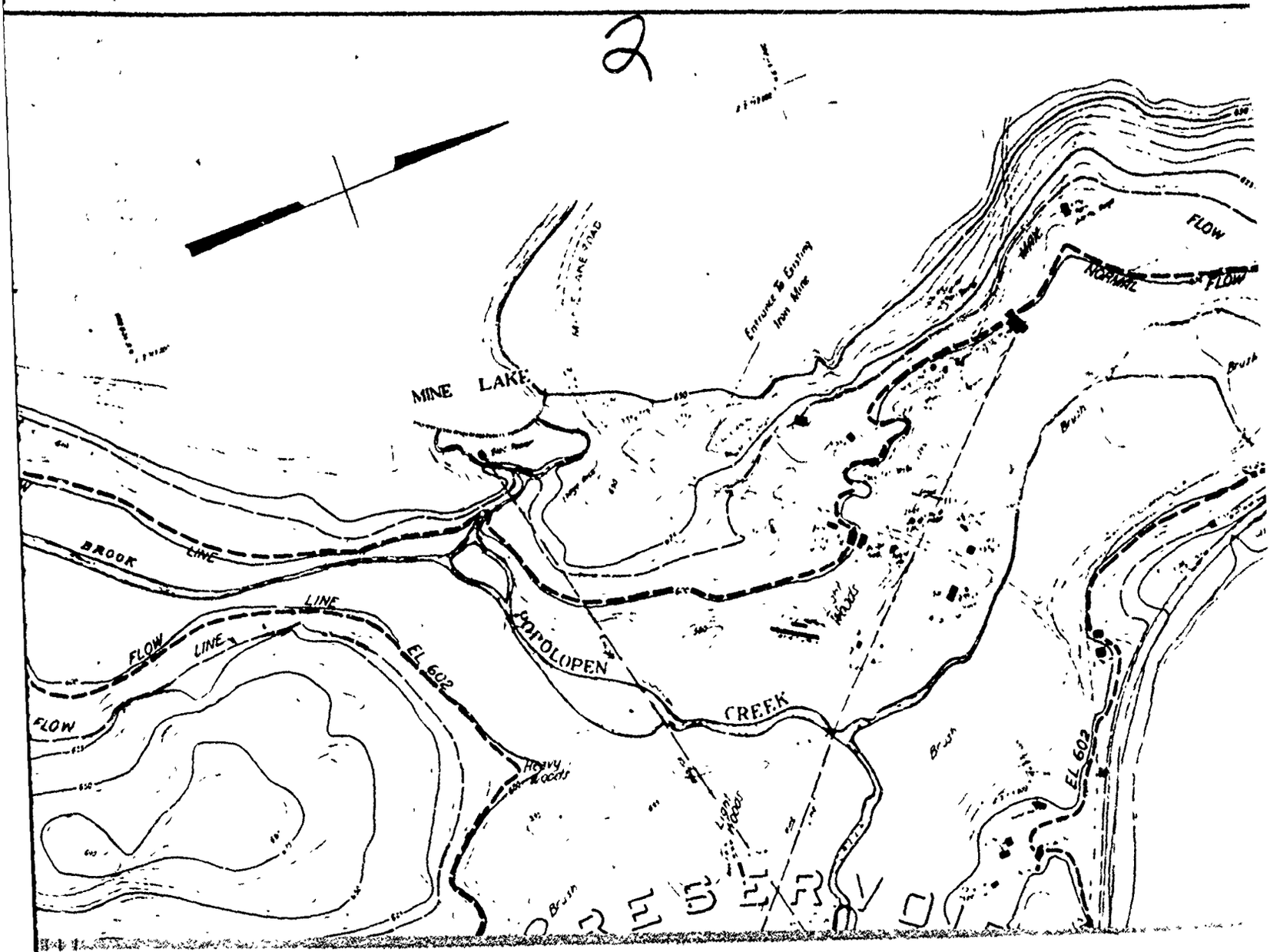
Submitted	Recommended	Approved
F.K. Gray, Jr. Engineer	Engineer	

1. Specifications Dated 8 June [illegible]

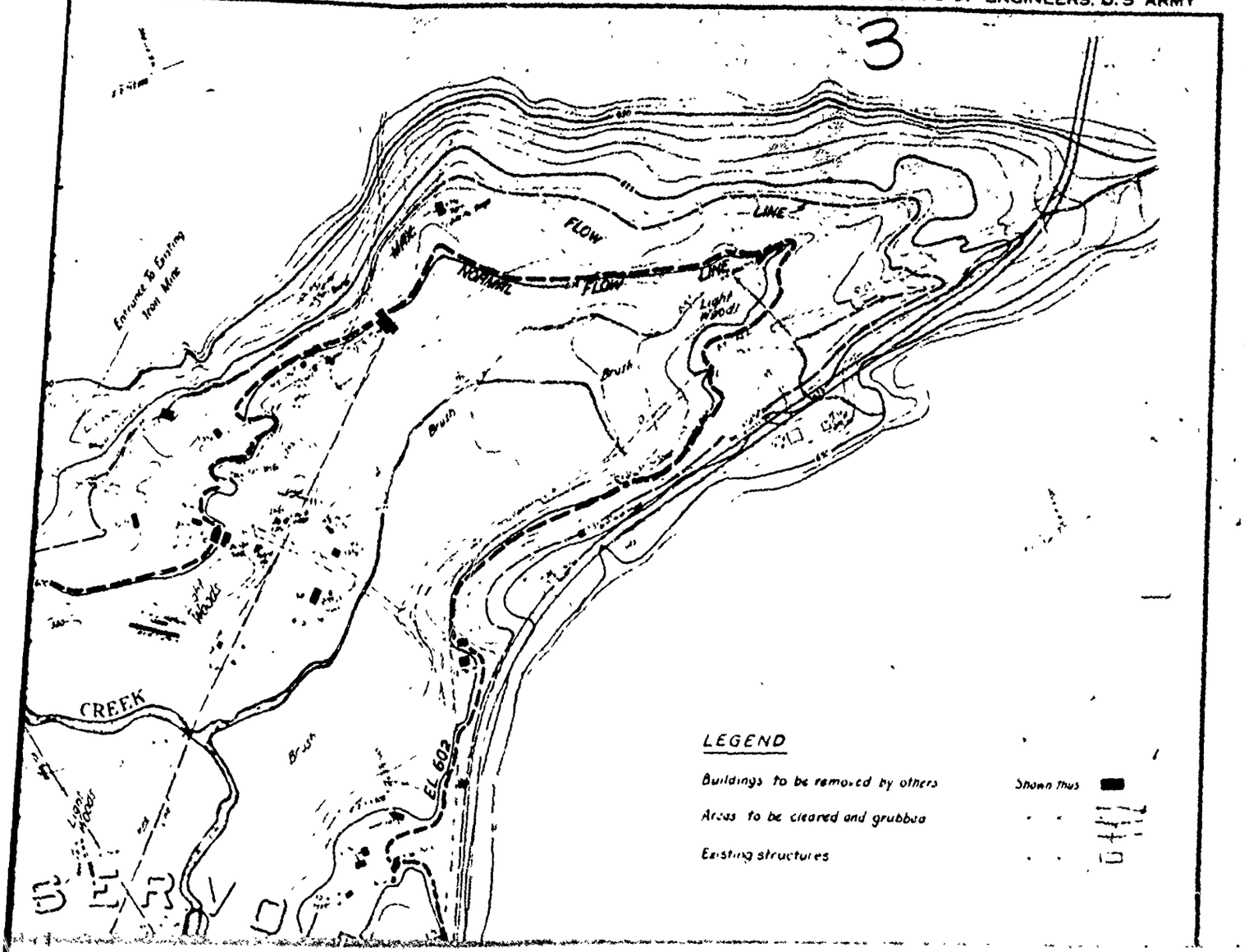
6

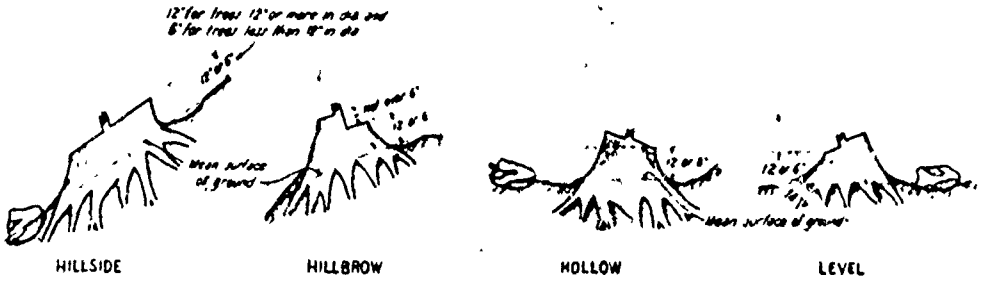
WAR DEPARTMENT




MINE LAKE
Entrance To Existing Iron Mine
FLOW
NORMAL
BROOK
LINE
FLOW
LINE
EL 602
FLOW
MYTOLOPEN
CREEK
Heavy Woods
Light Woods
Brush
EL 602

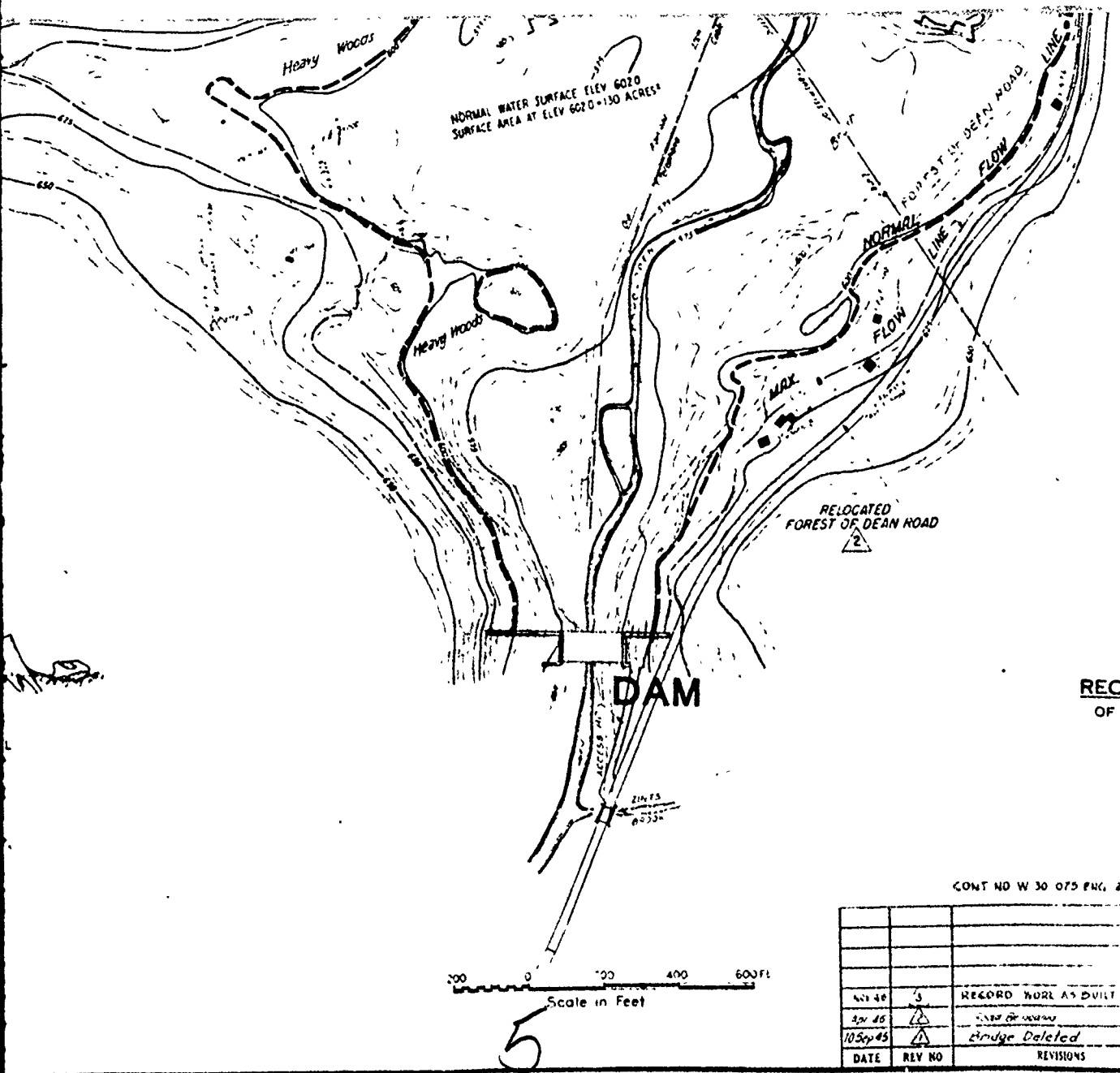
CORPS OF ENGINEERS, U.S ARMY





DETAIL OF CLEARING AND GRUBBING

4



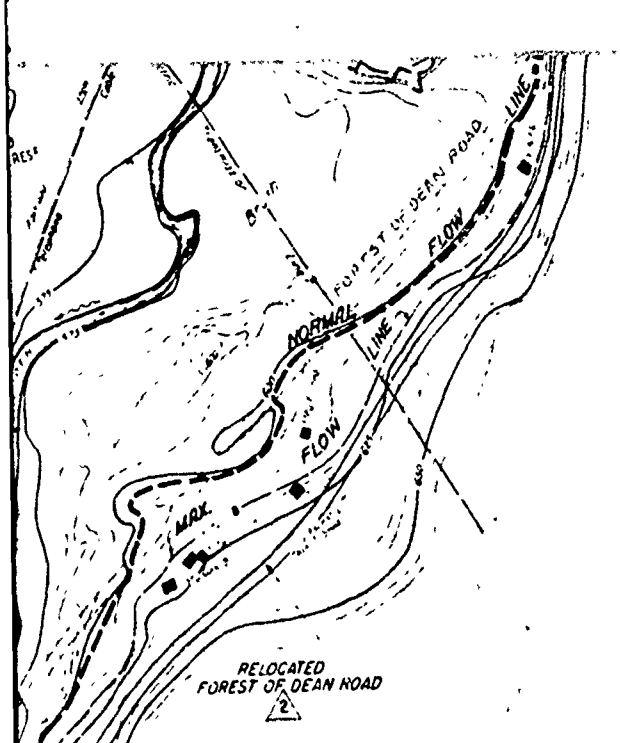
5

RECORD DRAWING
OF WORK - AS BUILT

Contracting Officer
[illegible]

CONT NO W 30 075 ENG 2846

DATE	REV NO	REVISIONS	PLY BY	APP BY
[illegible]	3	RECORD WORK AS BUILT	J M	
30 Jan 46	2	[illegible]	JMS	
10 Sep 45	1	Bridge Deleted	HAT	



AM

400 600 Ft

NOTES

Area and volume curves for Reservoir shown on Sheet No 4

Contour interval = 5 ft

Existing Telephone Cable Line and existing High Voltage Electric Transmission Line will be relocated by others.

Entrance to existing Iron Mine shall be plugged with concrete Details of construction will be furnished at a later date and payment made under appropriate items

Existing Electric Distribution Lines along forest of Dean Road will be relocated by others

Elevations are based on U.S.C. & G.S. datum 0.00 M.S.L. Sandy Hook

Coordinate system is arbitrary

RECORD DRAWING
OF WORK · AS · BUILT

Jas Comey
Contracting Officer
15 November 1945

6

DC T 11703 8 MAY 45

CONT NO W 30 075 ENG 2846

Nov 46	3	RECORD WORK AS BUILT	J.T.M.	
Apr 46	2	Road re-located	J.W.S.	
10 Sep 45	1	Bridge Deleted	H.A.J.	
DATE	REV NO	REVISIONS	REV BY	APP. BY

UNITED STATES MILITARY ACADEMY

WATER SUPPLY DAM & RESERVOIR

RESERVOIR

POPOLOPEN — WEST POINT, N. Y.

IN 21 SHEETS — SHEET NO. 2

SCALES AS SHOWN

U.S. ENGINEER OFFICE, NEW YORK DISTRICT, NEW YORK, N.Y. 1945

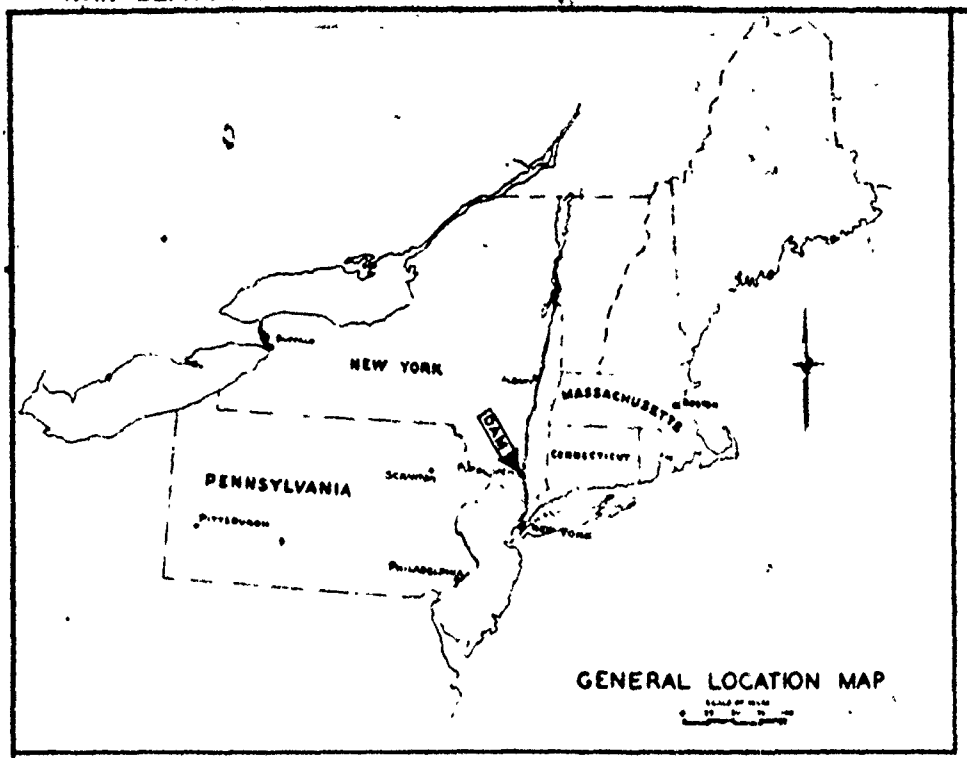
Reviewed: F. L. Parsons, Principal Engineer
Recommended: Chas. A. Palmer, Lt. Col. Corps of Engineers
Approved: E. W. Kenyon, Colonel, Corps of Engineers

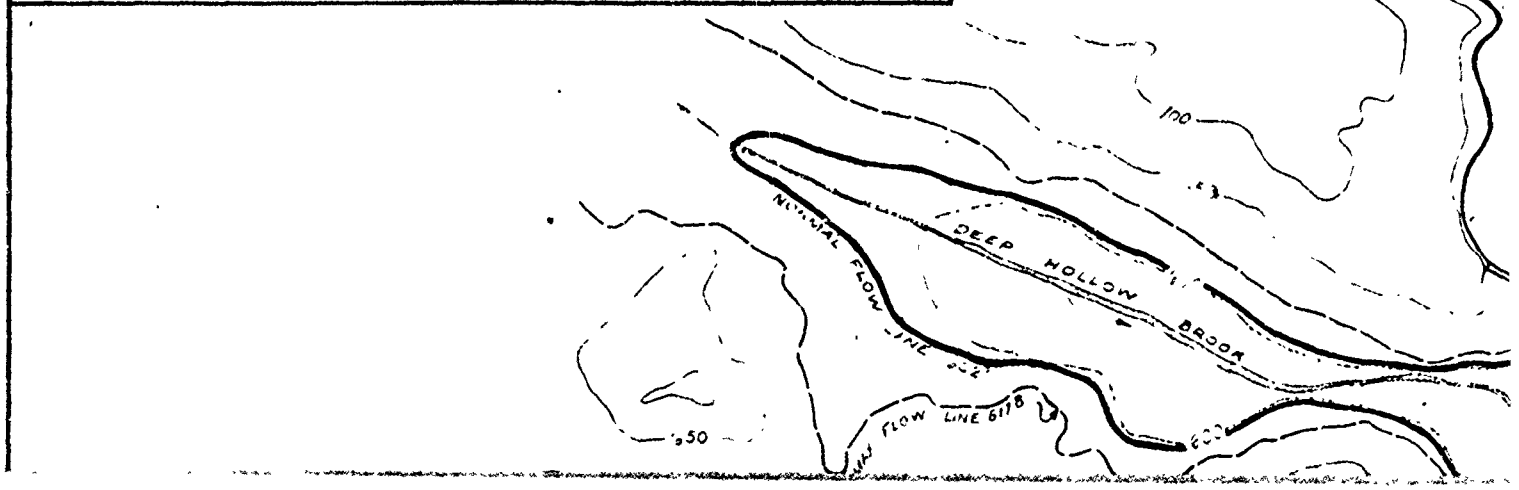
Submitted: M. F. Hegeman
Alexander Potter Associates, Architect-Engineers

To Accompany Specifications Dated 8 June 1945

7512 - 462

WAR DEPARTMENT





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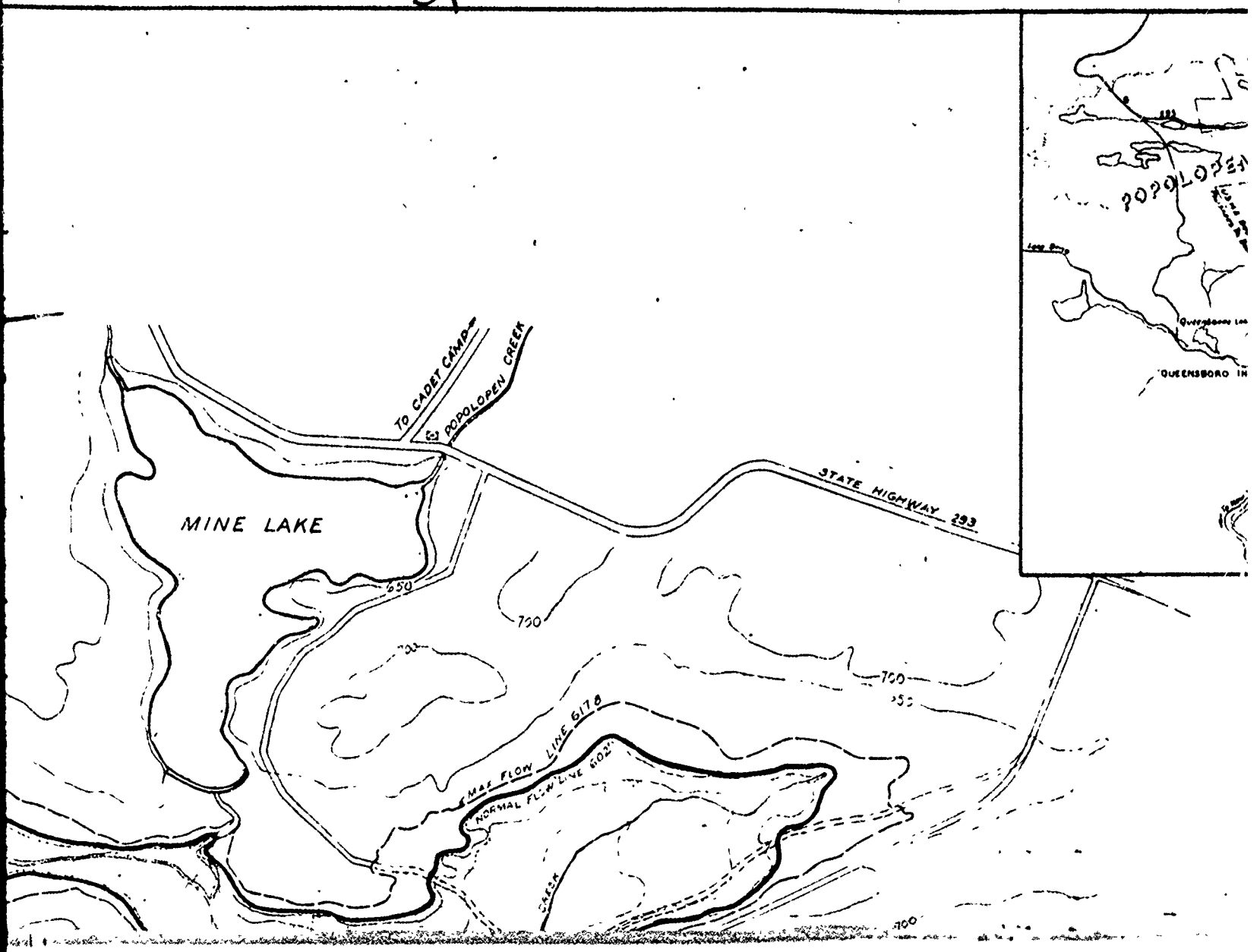
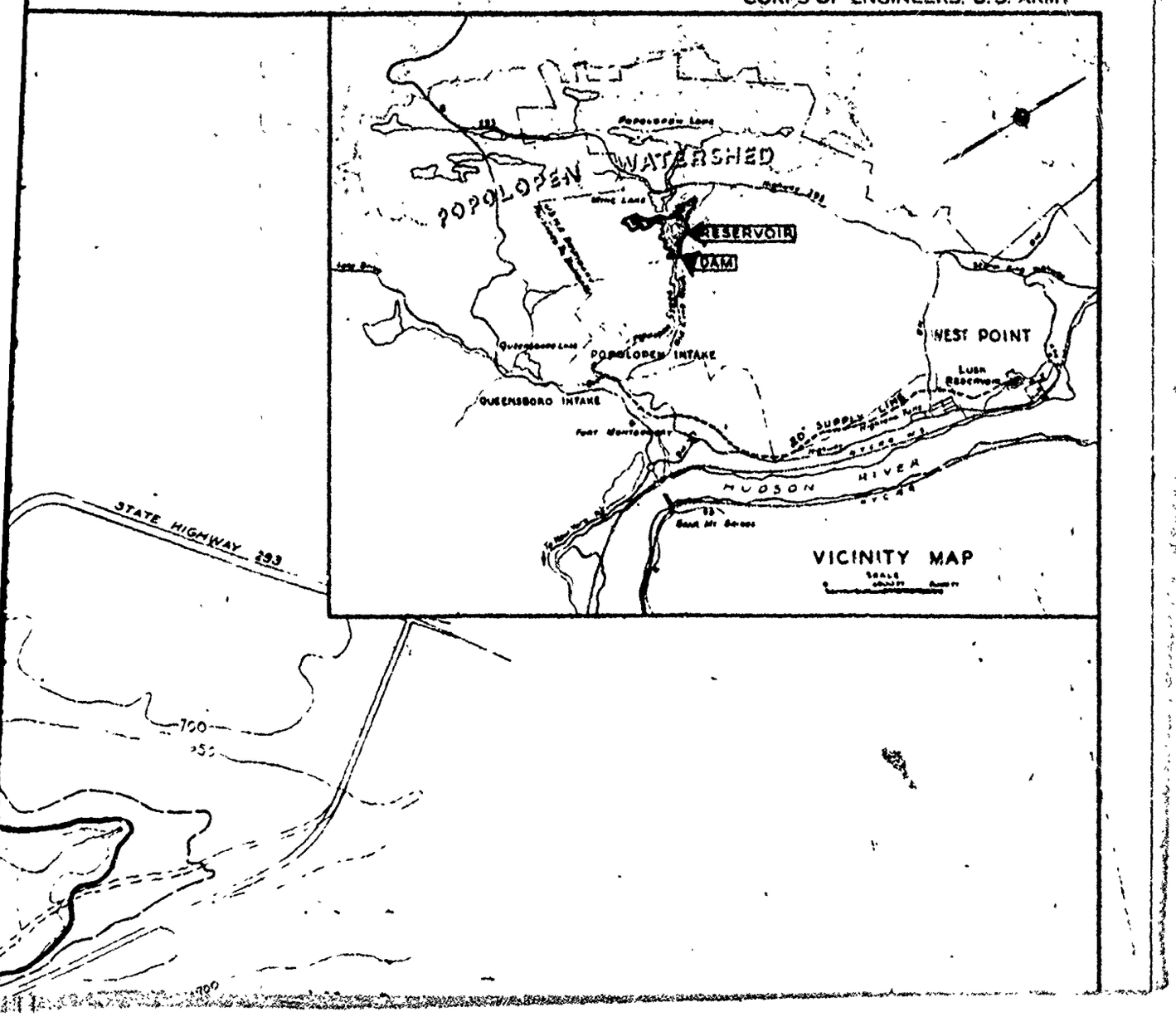
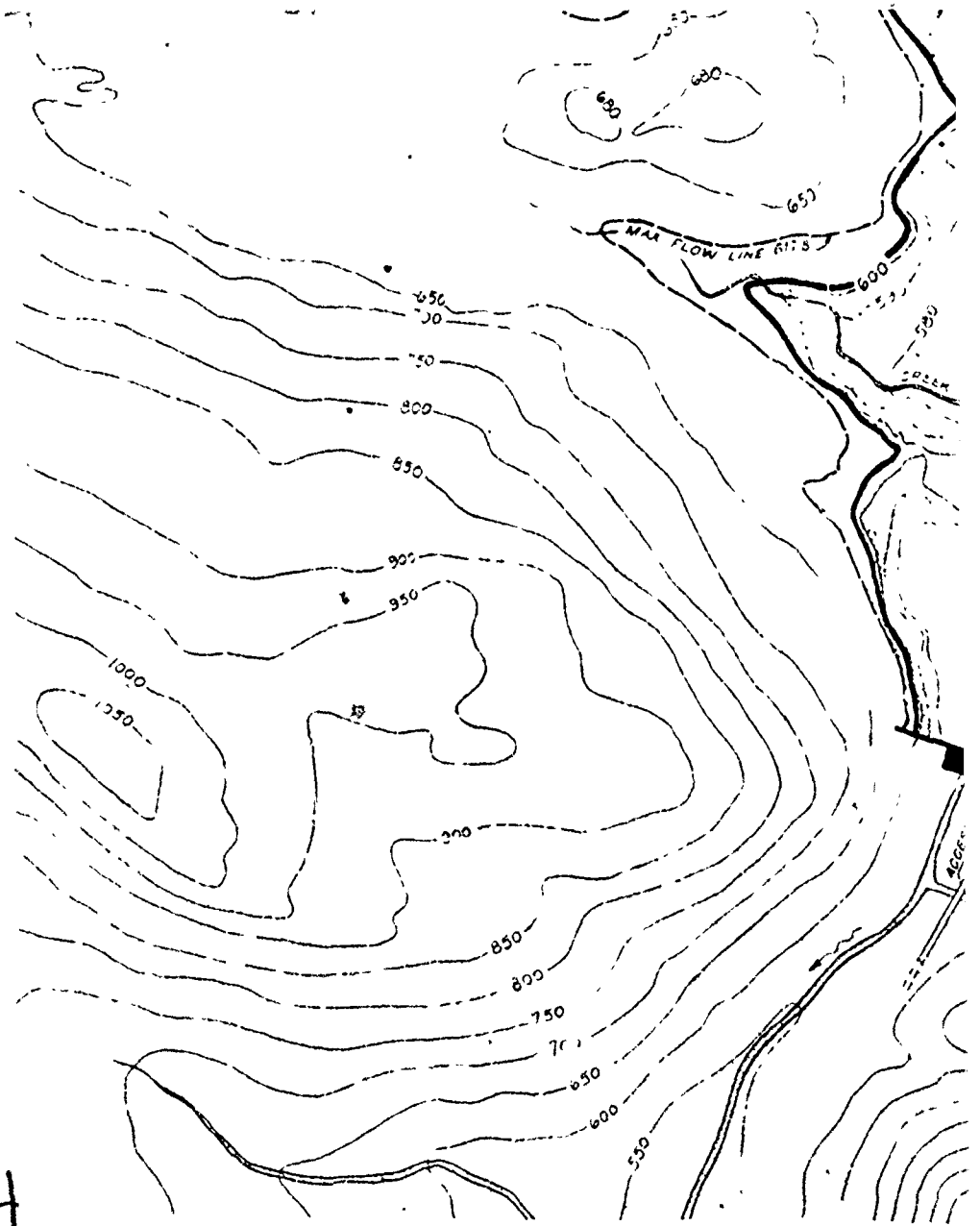

TO CADET CAMP
POPOLOPEN CREEK
STATE HIGHWAY 293
MINE LAKE
650
700
700
700
MAX FLOW LINE 6178
NORMAL FLOW LINE 6021
700
POPOLOPEN
QUEENSBORO

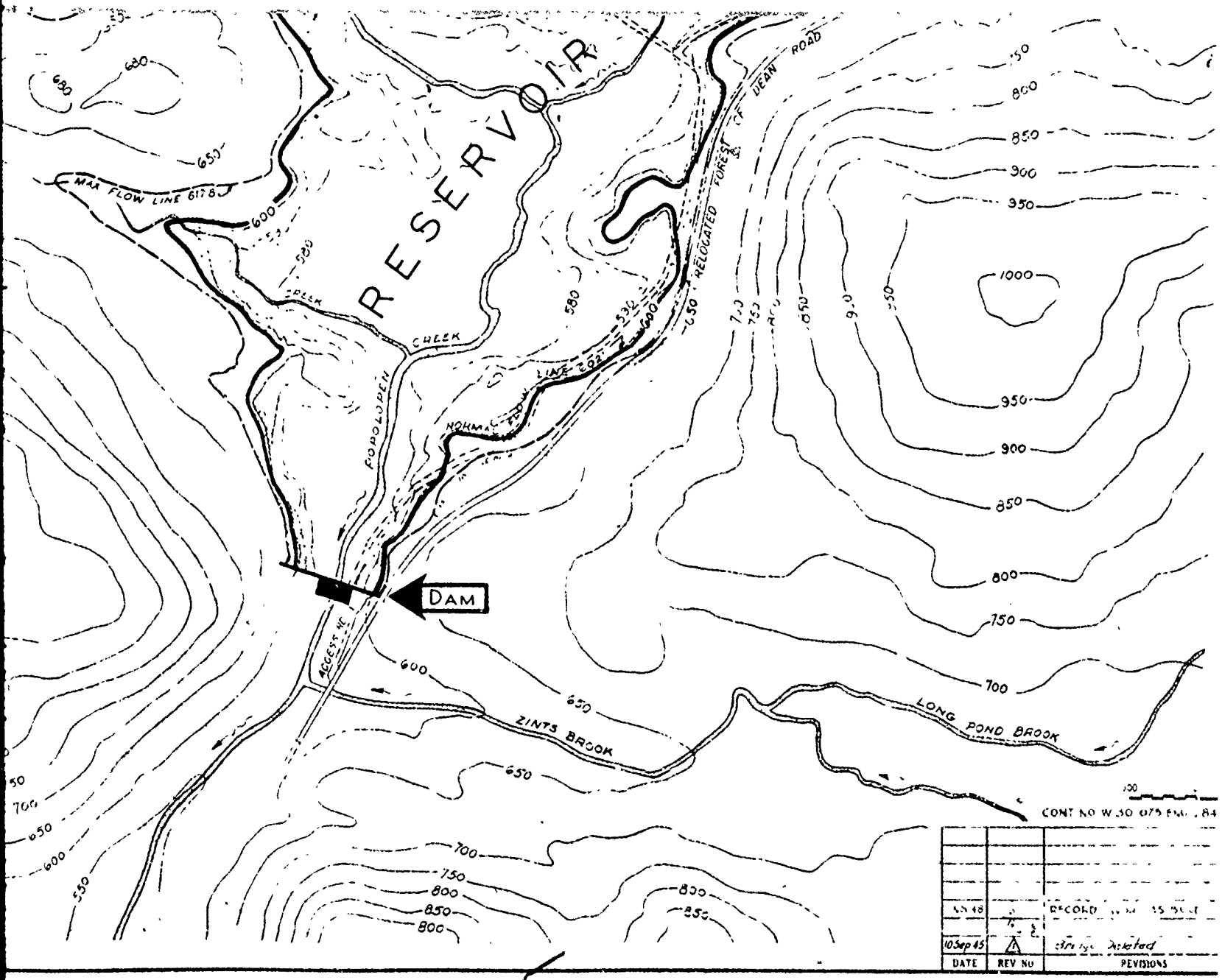
3

CORPS OF ENGINEERS, U.S. ARMY

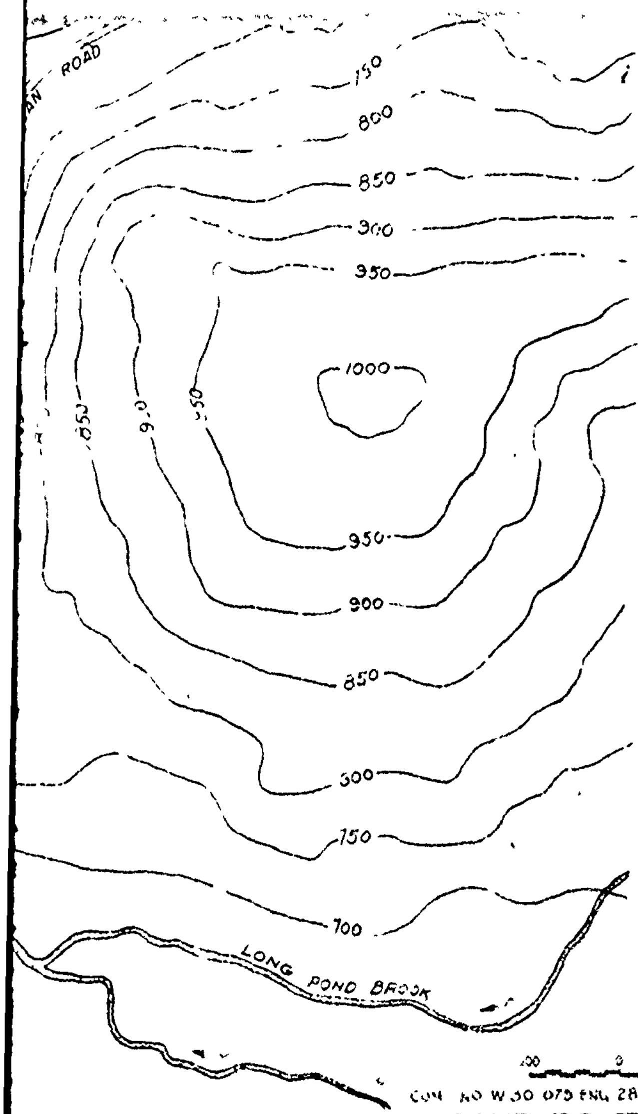



650
MAX FLOW LINE RIT'S
600
550
800
850
900
950
1000
1050
750
700
650
600
550

4


RESERVOIR
DAM
MAX FLOW LINE 617.8
RELOCATED FOREST OF DEAN ROAD
POPOLOPEN CREEK
NORMAL POOL LINE 602
ACCESS RD
ZINTS BROOK
LONG POND BROOK
CONT NO W 30 079 ENG . 84
RECORD
10Sep45
DATE
REV NO
REVISIONS

5



Contours shown are intended to indicate the general nature of topography in vicinity of dam and shall not be used for any other purpose

Elevations are based on U.S.C.& G.S. datum 0.00 M.S.L. Sandy Hook.

RECORD DRAWING
OF WORK - AS - BUILT

Contracting Officer

OC T 11703 8 MAY 45

CONT NO W 30 075 ENG 2846

[illegible]		RECORD WORK AS BUILT	JJM	
	2		JHS	FLP
10 Sep 45	1	Arrows Deleted	HAT	
DATE	REV NO	REVISIONS	REV BY	APP BY

UNITED STATES MILITARY ACADEMY
WATER SUPPLY DAM & RESERVOIR
GENERAL LOCATION PLAN

POPOLOPEN WEST POINT, N. Y.

IN 21 SHEETS SHEET NO. 1

SCALES AS SHOWN

U. S. ENGINEER OFFICE NEW YORK DISTRICT, NEW YORK N.Y. 1945

Reviewed: Principal Engineer — Recommended: Lt. Col. Corps of Engineers — Approved: Colonel, Corps of Engineers

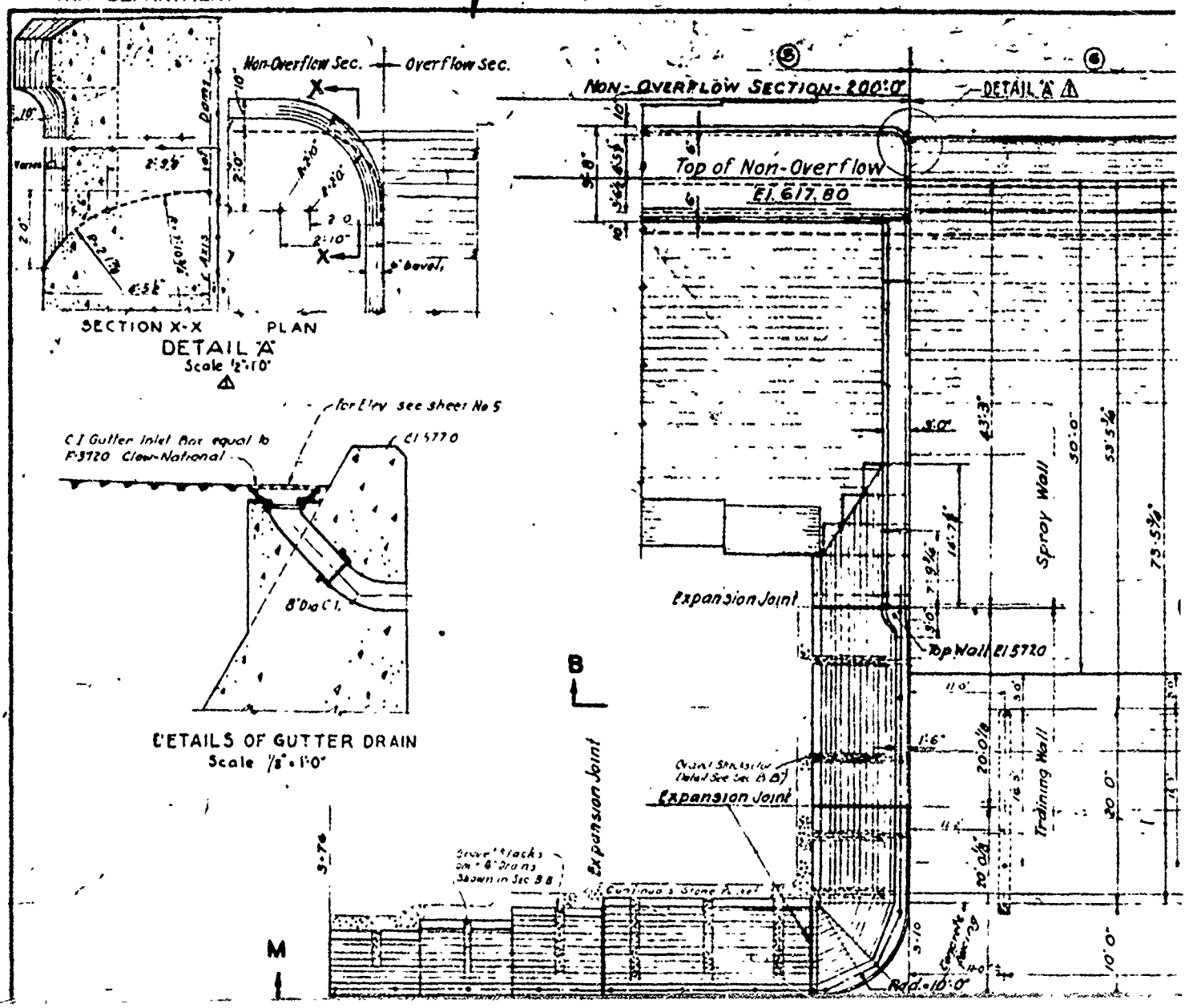
Submitted: Alexander Potter Associates, Architect Engineers

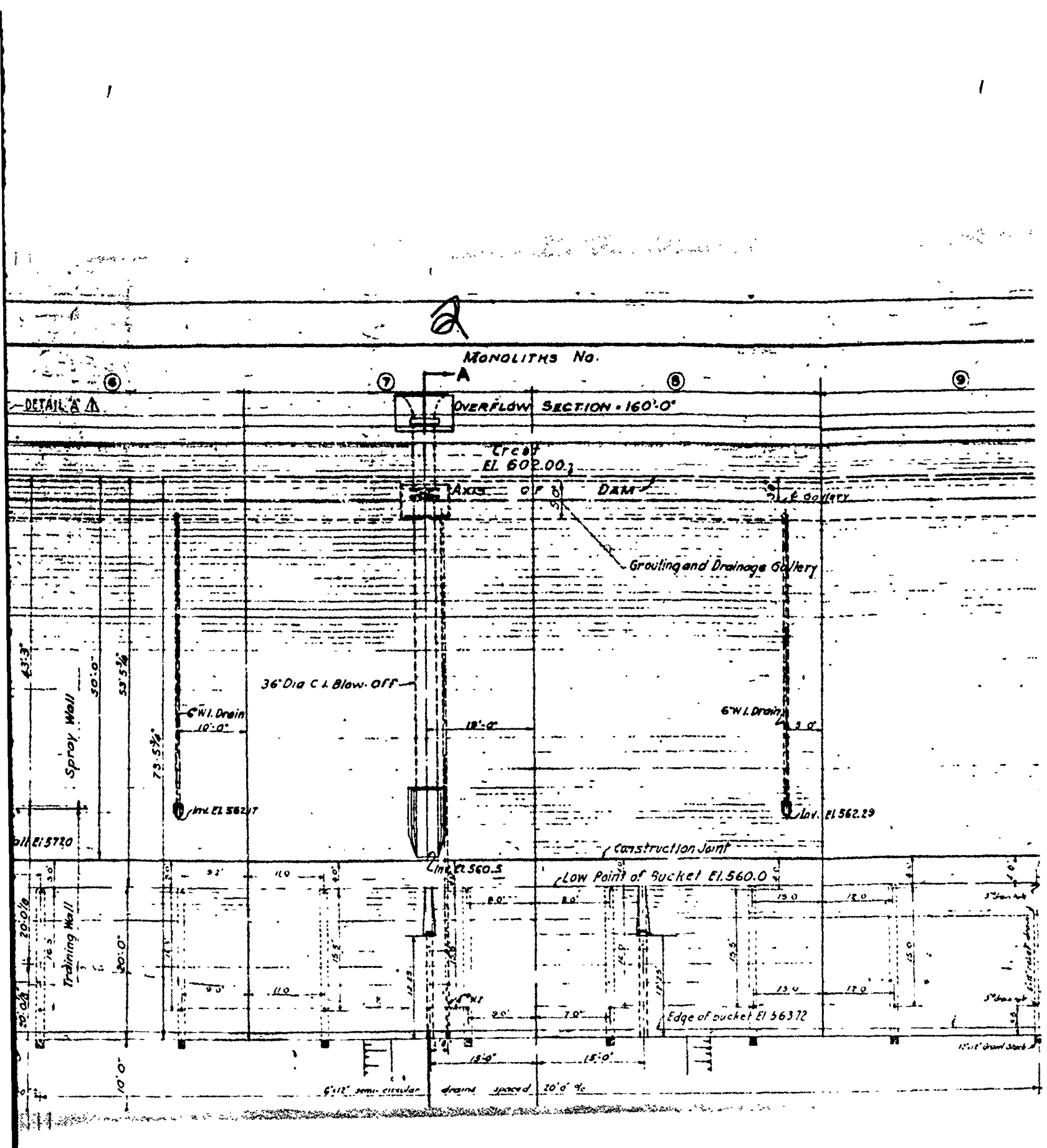
6

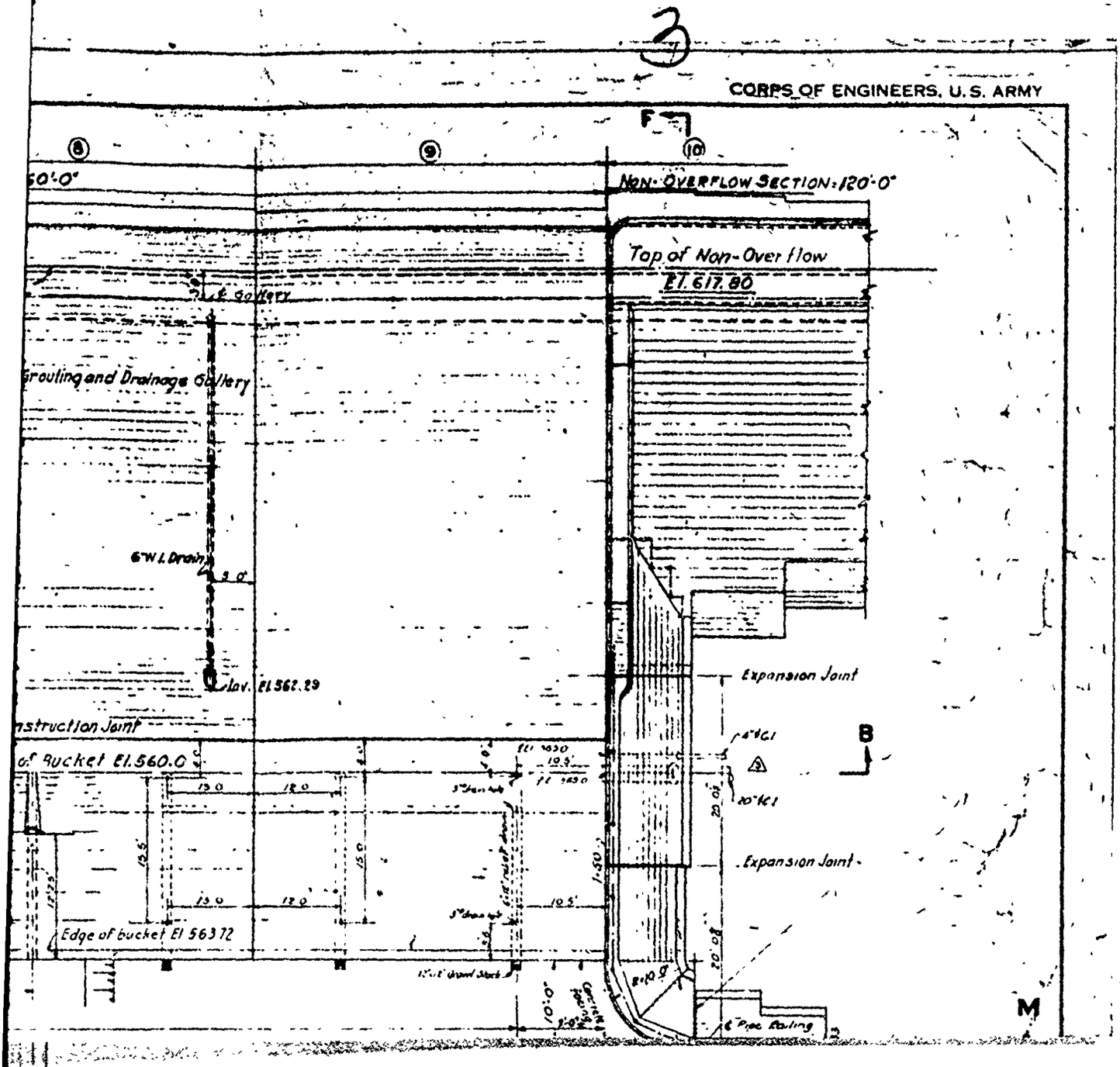
To Accompany Specifications Dated 8 June 1945

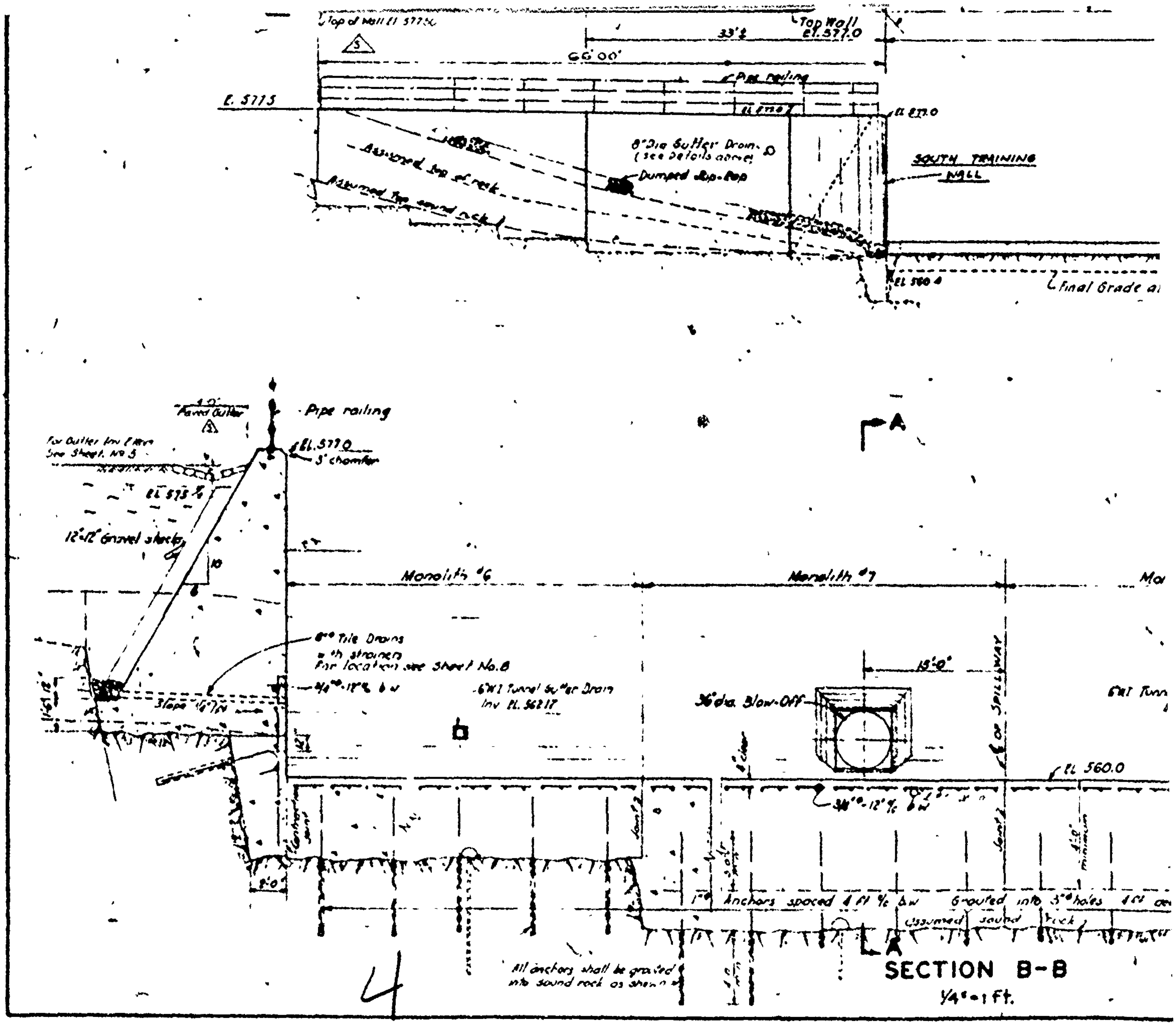
7512 - 461

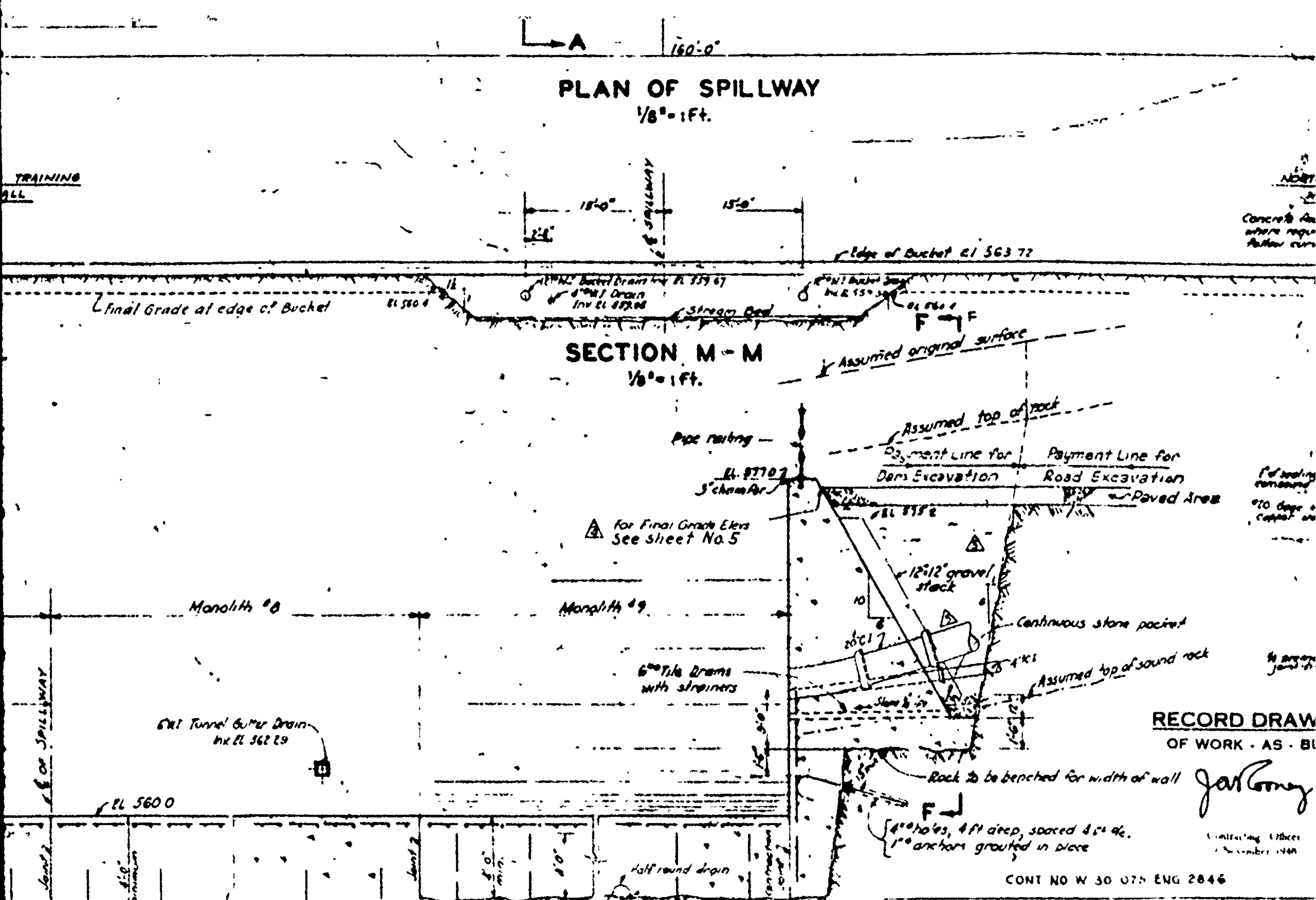
WAR DEPARTMENT



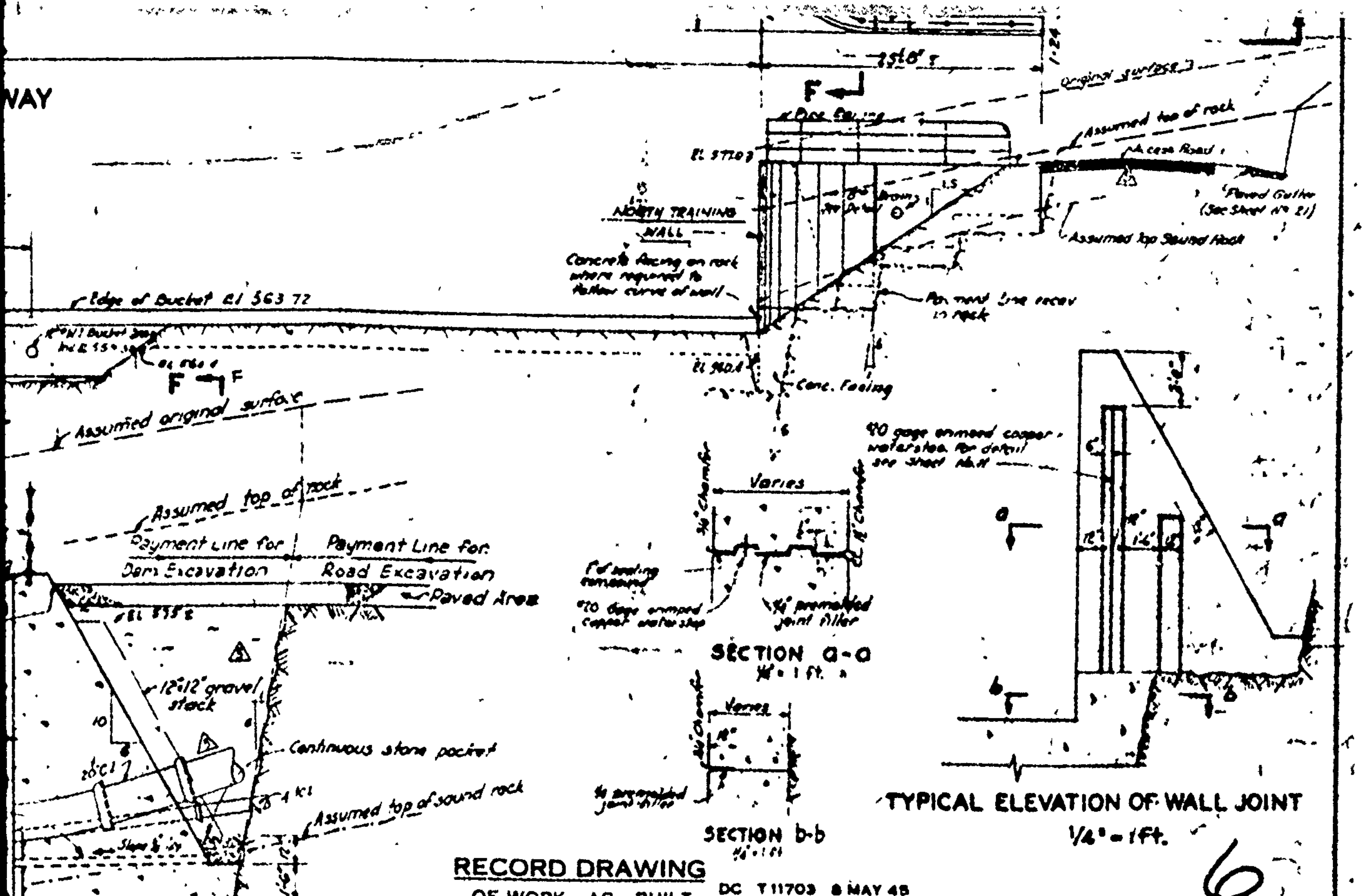

MONOLITHS No.
DETAIL 'A'
OVERFLOW SECTION - 160'-0"
Crest El. 602.00
Axis of Dam
Grouting and Drainage Gallery
36" Dia C.I. Blow-off
6" W.I. Drain
Inv. El 562.17
Inv. El 562.29
Spray Wall
Training Wall
Construction Joint
Low Point of Bucket El. 560.0
Inv. El. 560.5
Edge of bucket El 563.72
6"x12" semi-circular drains spaced 20'-0" c/c


CORPS OF ENGINEERS, U.S. ARMY
NON-OVERFLOW SECTION: 120'-0"
Top of Non-Overflow
El. 617.80
Grouting and Drainage Gallery
6" W.L. Drain
Elev. El 562.29
Expansion Joint
Expansion Joint
Edge of bucket El 563.72
Pipe Railing


Top of Wall El. 577.5
Top Wall El. 577.0
33'±
66'00"
E. 577.5
Pipe railing
8" Dia Gutter Drain (see Details above)
Dumped Rip-Rap
Assumed top of rock
Assumed top sound rock
SOUTH TRAINING WALL
El. 577.0
El. 560.0
Final Grade
Pipe railing
Paved Gutter
For Gutter Inv. Elev. See Sheet No. 5
El. 577.0
3" chamfer
12"x12" Gravel strip
Monolith #6
Monolith #7
8" Tile Drains with strainers. For location see Sheet No. 8
6"x1 Tunnel Gutter Drain Inv. El. 562.17
36" dia. Blow-Off
15'-0"
℄ of SPILLWAY
El. 560.0
Anchors spaced 4 ft % bw Grouted into 3" holes
assumed sound rock
All anchors shall be grouted into sound rock as shown
SECTION B-B
1/4" = 1 Ft.
4



DATE	REV NO	REVISIONS	REV BY	APP BY
	6	RECORD WORK AS BUILT	J J M	
	5	[illegible]	[illegible]	
8/27 45	4	Added Gutter dimension [illegible]	A F A	
" "	3	[illegible] reference Note	A F A	
" "	2	Added note referring to Grades	A F A	
" "	1	Added detail "A"	A F A	



6

RECORD DRAWING
OF WORK - AS - BUILT

Contracting Officer
14 November 1948

CONT NO W-30-075 ENG 2846

DC T11703 8 MAY 45

UNITED STATES MILITARY ACADEMY

WATER SUPPLY DAM & RESERVOIR

PLAN OF SPILLWAY & BUCKET SECTIONS

POPOLOPEN — WEST POINT, N. Y.

IN 21 SHEETS — SHEET NO. 6

SCALES AS SHOWN

U S ENGINEER OFFICE NEW YORK DISTRICT, NEW YORK N.Y. 1945

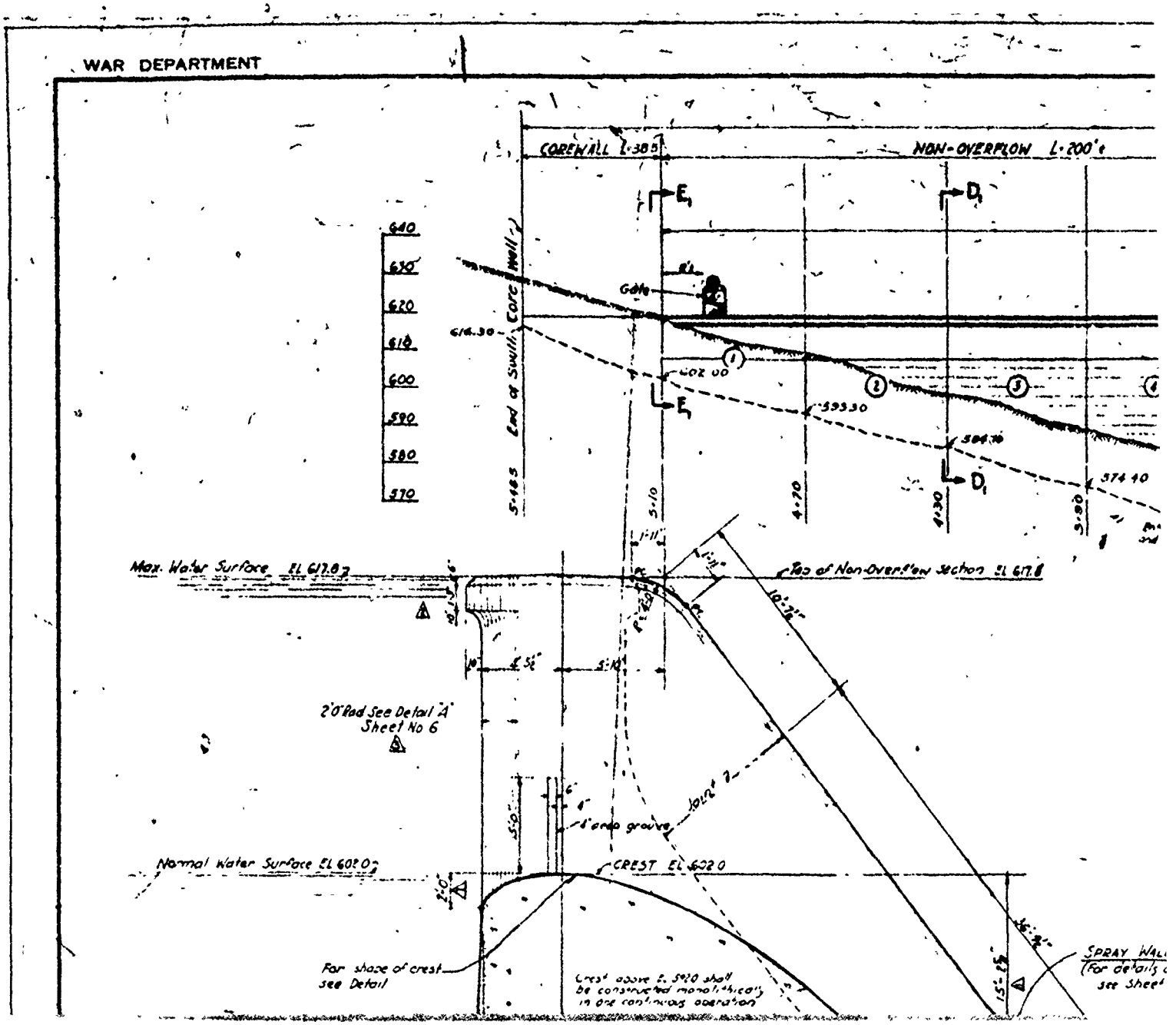
Reviewed: F. F. Panuzio, Principal Engineer
Recommended: Lt. Col. Corps of Engineers
Approved: Colonel, Corps of Engineers
Submitted: Alexander Potter Associates, Architects - Engineers

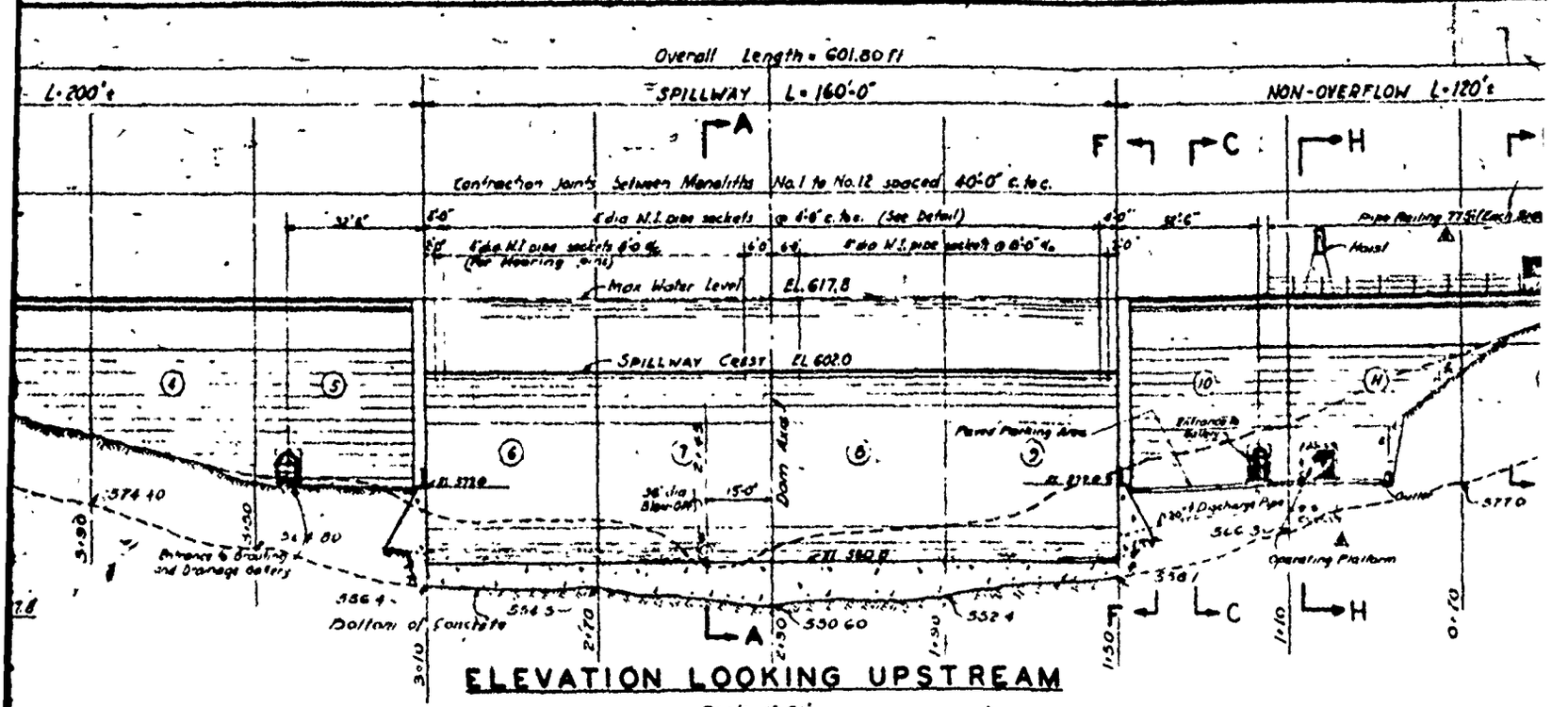
DATE	REV NO	REVISIONS	REV BY	APP. BY
[illegible] 48	6	RECORD WORK AS BUILT	JJM	
23 Apr 46	5	[illegible]	JWS	[illegible]
8/27/45	4	Added Gutter dimension	AFA	
"	3	" " reference Note	APA	
"	2	Added note refering to Grades	APA	
"	1	added detail "A"	AFA	

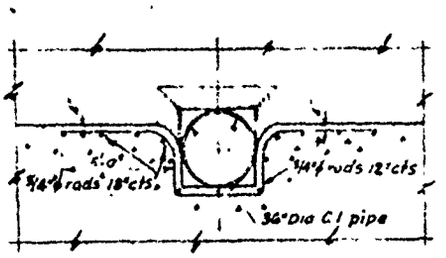
To Accompany Specifications Dated [illegible] 1945

7512 - 466

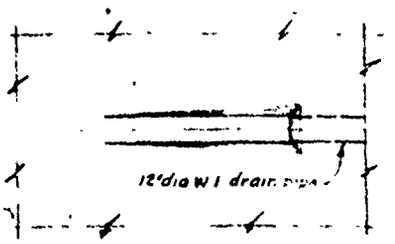
WAR DEPARTMENT



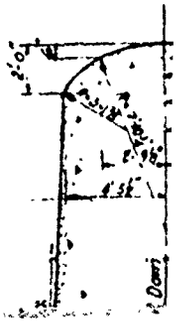




SECTION a-a
1/4" = 1 ft.



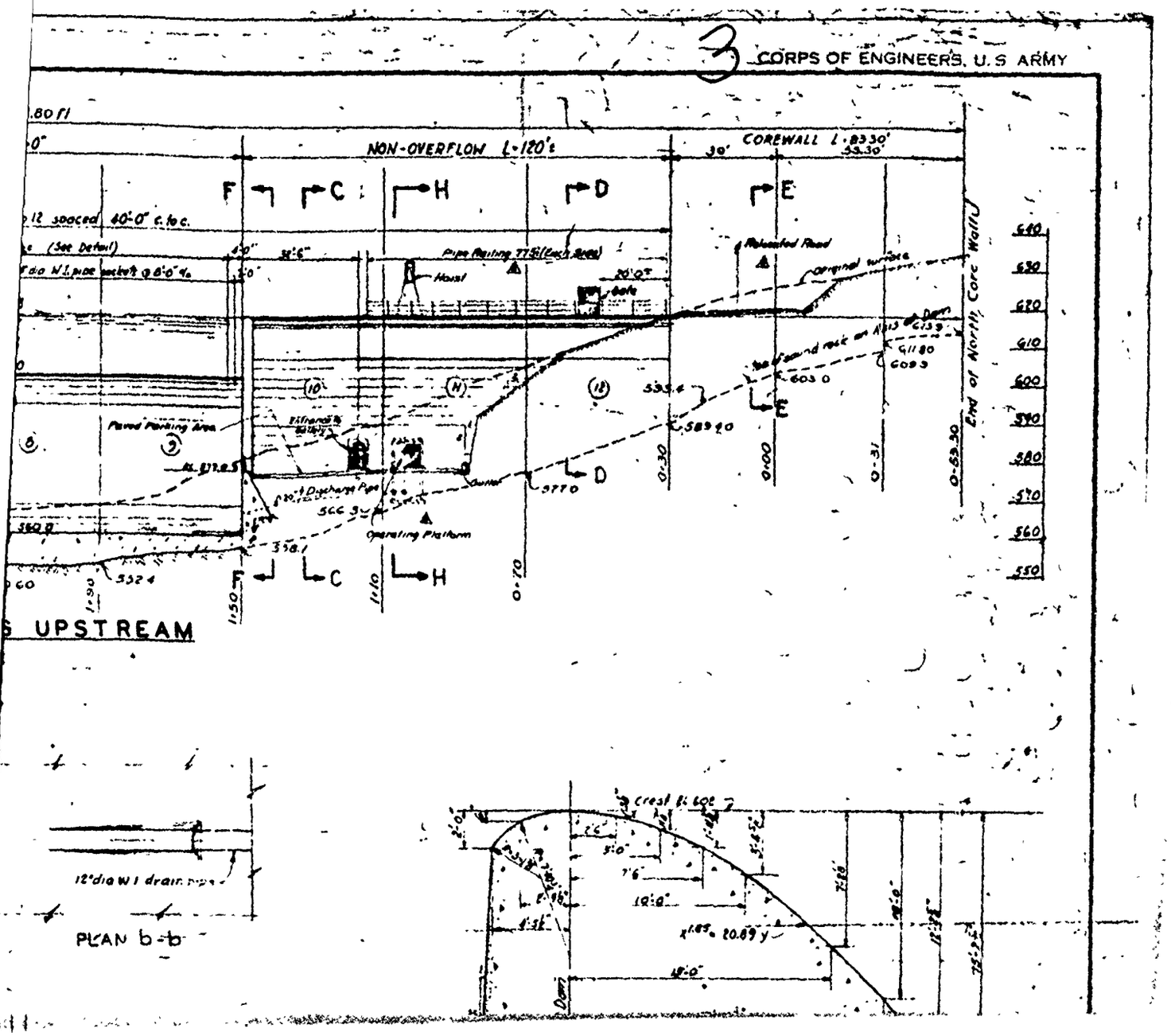
PLAN b-b

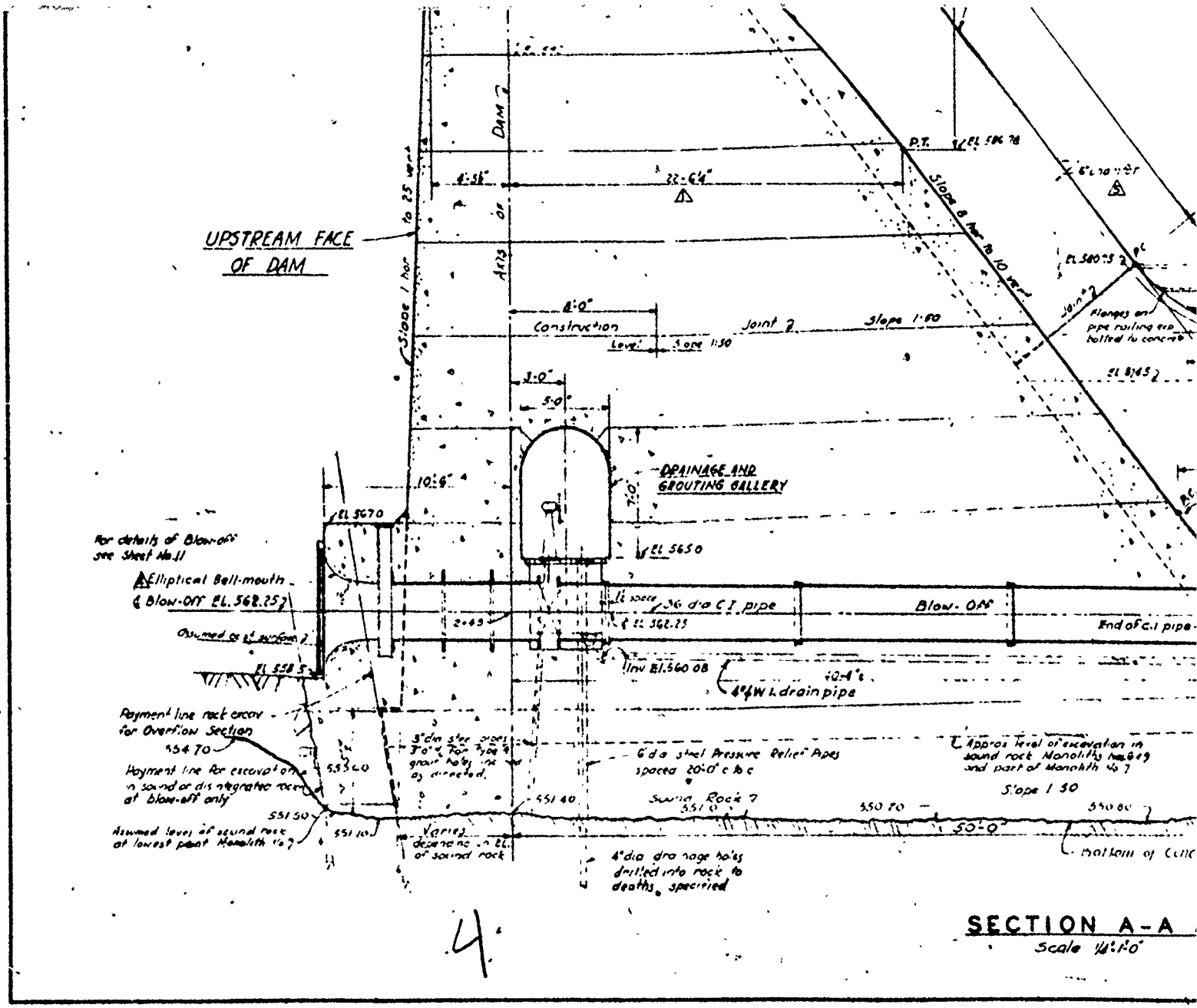


SPRAY WALL
(For details of construction see Sheet No. 8)

3

CORPS OF ENGINEERS, U.S ARMY

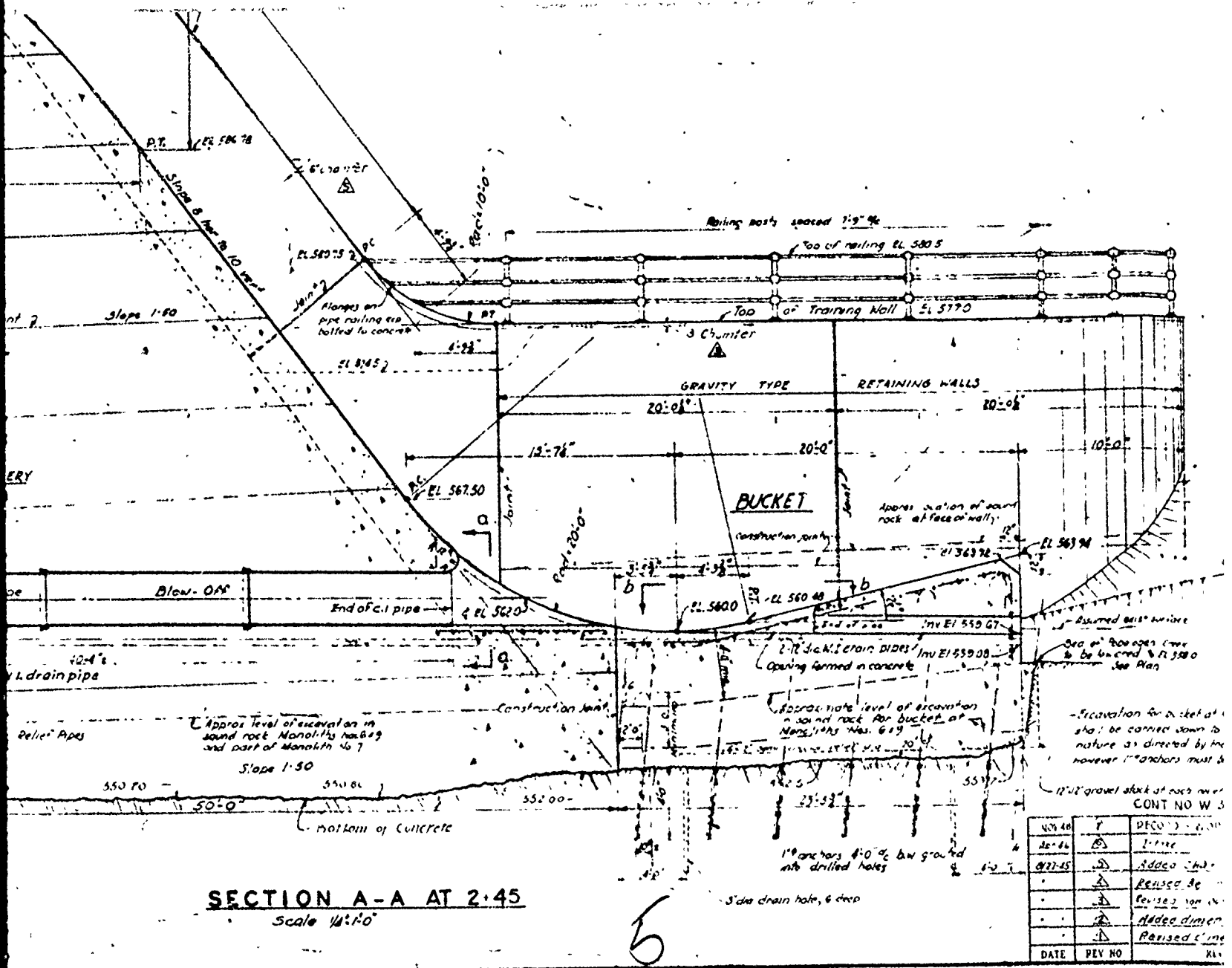




4

SECTION A-A

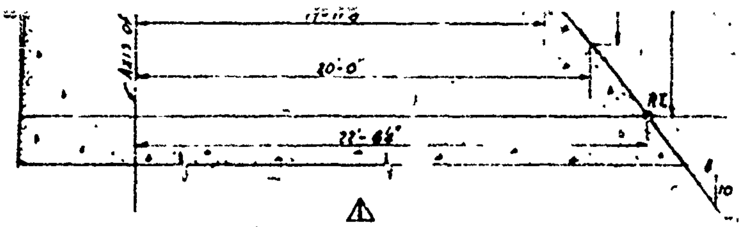
Scale 1/8"=1'-0"



SECTION A-A AT 2:45

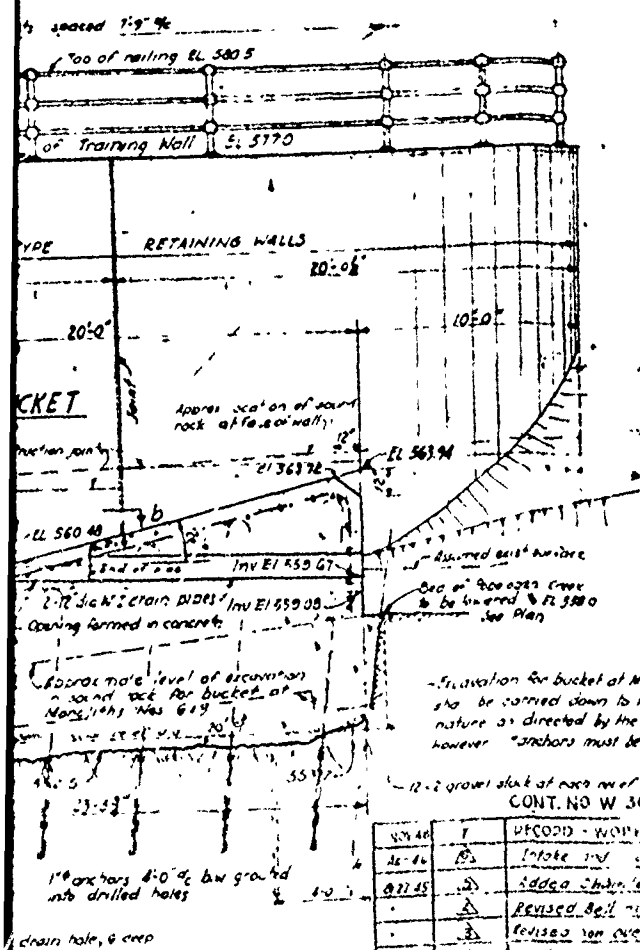
Scale 1/8"=1'-0"

6



DETAIL OF CREST

Scale ½"=1'-0"



Note
Edges of concrete at contraction joints of Spillway Monoliths shall be chamfered 1½" on the upstream face and only 3/4" on the downstream face.

Excavation for bucket at Monoliths Nos 7 & 8 shall be carried down to rock of a satisfactory nature as directed by the Contracting Officer, however anchors must be grouted into sound rock.

12 x 2 gravel stack at each row of drain

RECORD DRAWING
OF WORK - AS - BUILT
Contracting Officer
11 November 1946

6

DC T11703 8 MAY 45

CONT. NO W 30 075 ENG 2846

DATE	REV NO	REVISIONS	REV BY	APP BY
10-11-46	7	RECORD - WORK AS BUILT	JJM	
3-5-46	6	Intake and ... relocated	JHS	FLP
8-21-45	5	Added Character	APA	
.	4	Revised Bell mouth	APA	
.	3	Revised ... overflow Section	APA	
.	2	Added dimensions	APA	
.	1	Revised dimensions	APA	

UNITED STATES MILITARY ACADEMY

WATER SUPPLY DAM & RESERVOIR

SPILLWAY SECTION & ELEVATION OF DAM

POPOLOPEN — WEST POINT, N. Y.

IN 21 SHEETS — SHEET NO 7

SCALES AS SHOWN

U. S. ENGINEER OFFICE, NEW YORK DISTRICT, NEW YORK, N. Y. 19

Reviewed — Recommended — Approved

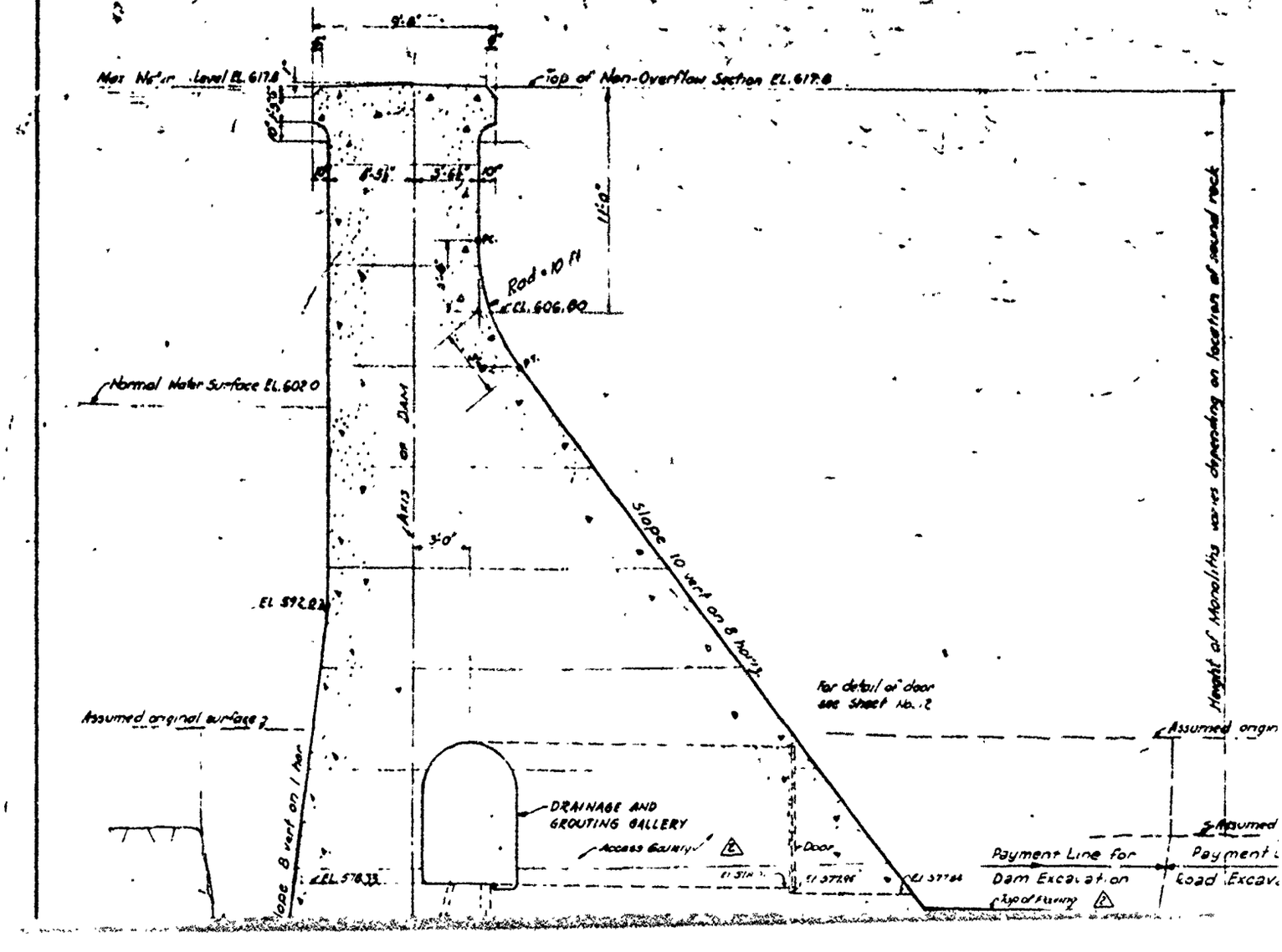
F. L. Parr... — Principal Engineer — Lt Col Corps of Engineers — Colonel, Corps of Engineers

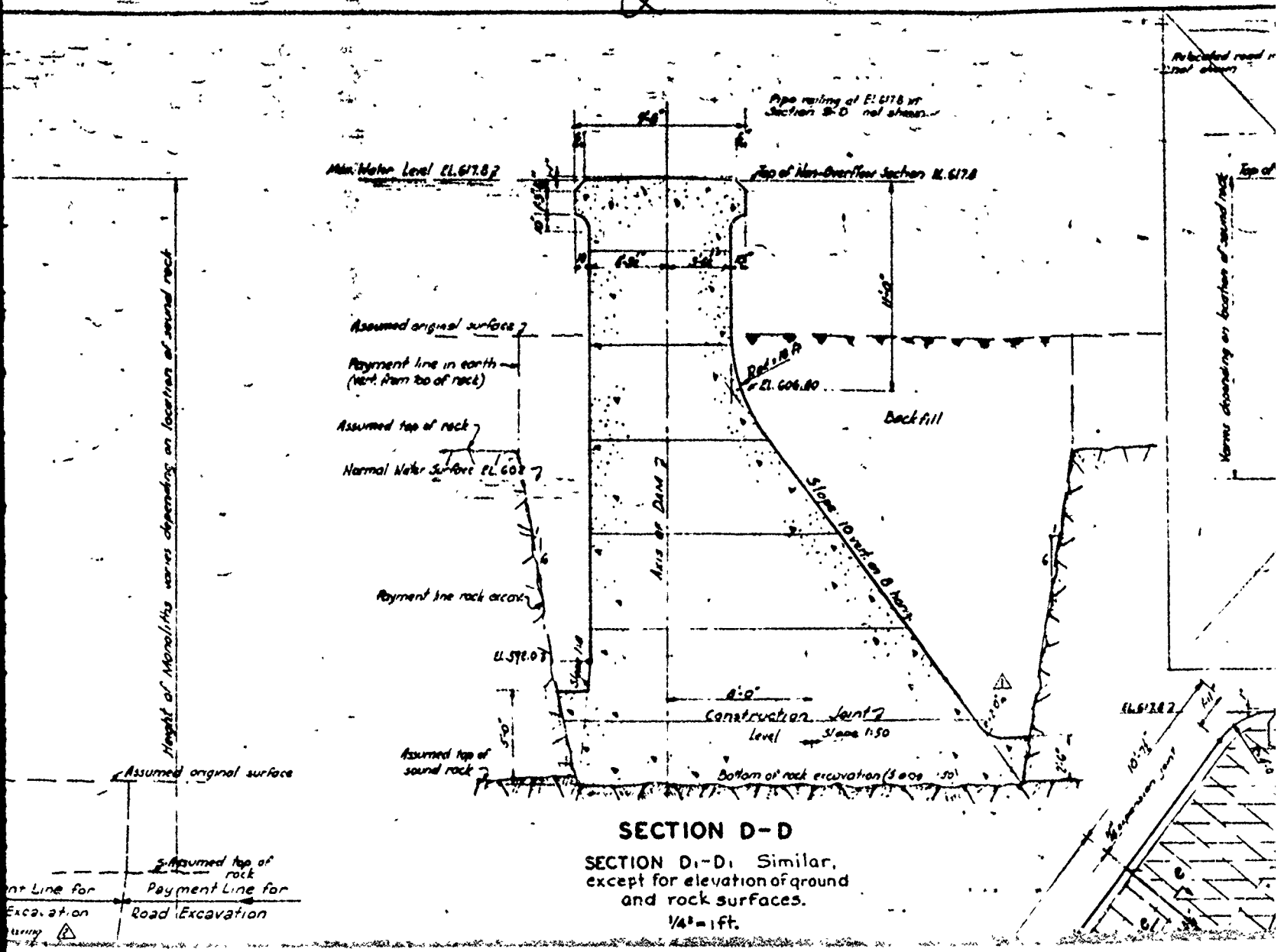
Submitted
Alexander Potter Associates, Architect - Engineers

Accompanies Specifications Dated ... June 1945

7512-467

WAR DEPARTMENT





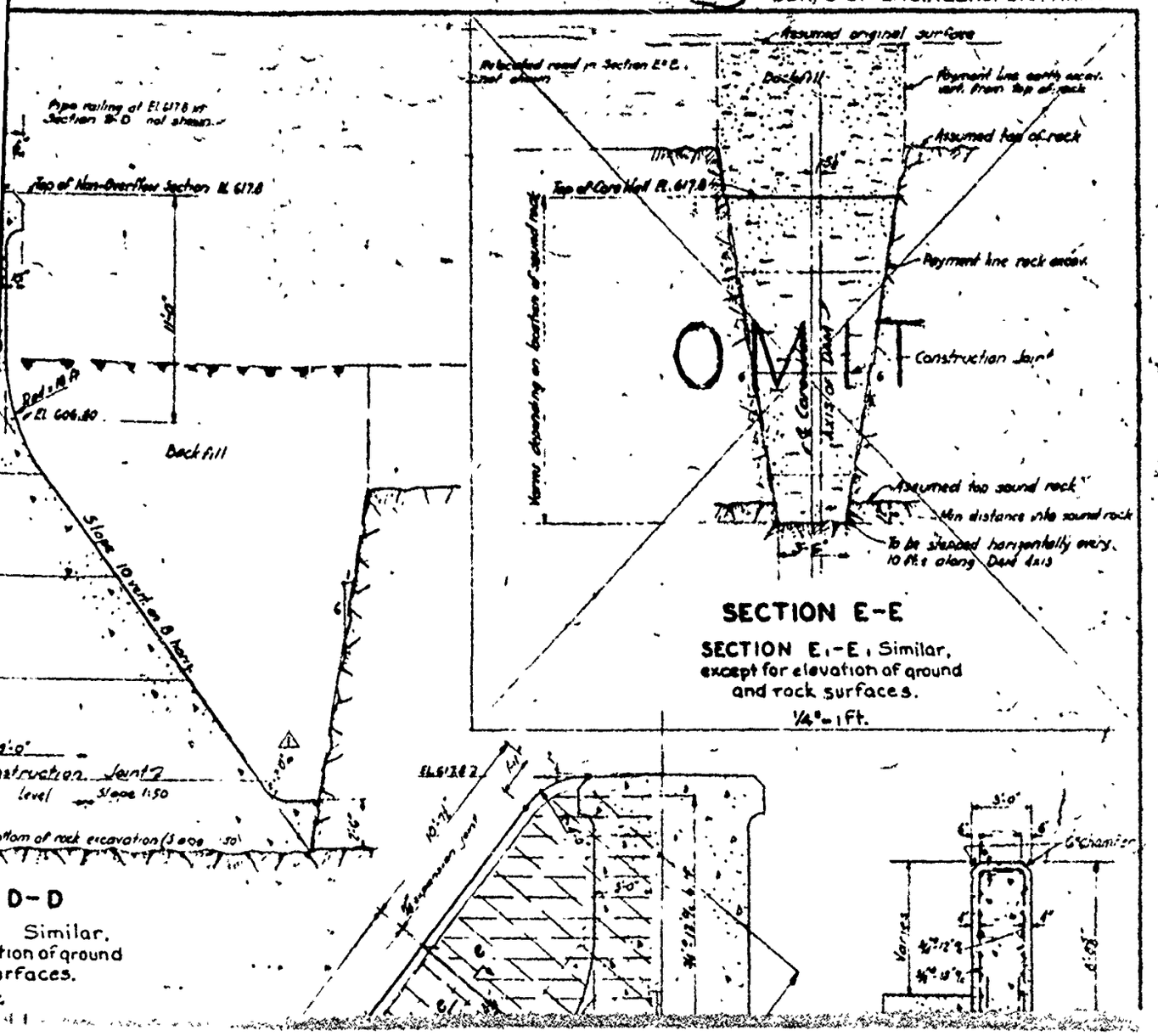
SECTION D-D

SECTION D_1-D_1 Similar, except for elevation of ground and rock surfaces.

1/4" = 1 ft.

3

CORPS OF ENGINEERS, U. S. ARMY



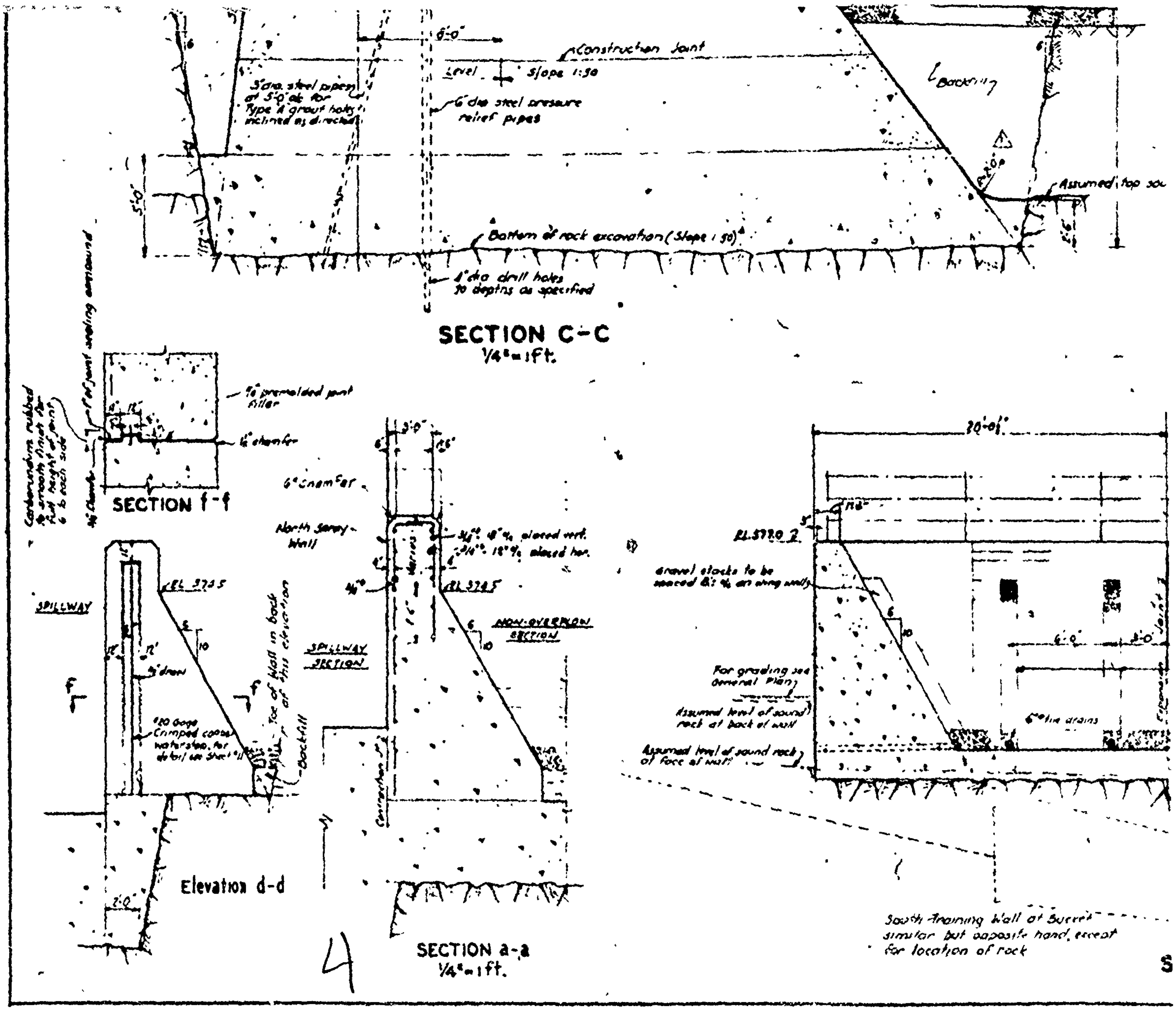
SECTION E-E

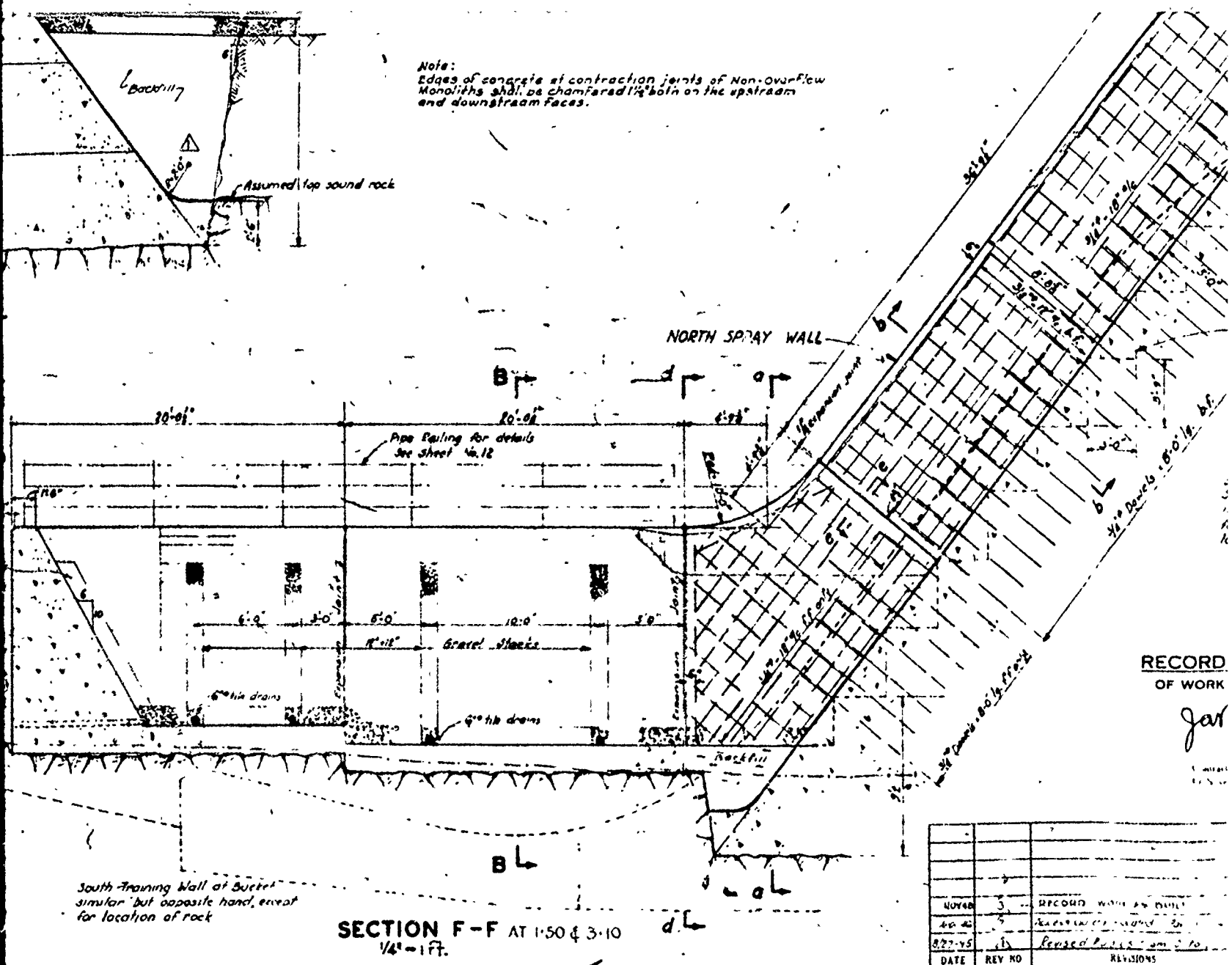
SECTION E₁-E₁ Similar, except for elevation of ground and rock surfaces.

1/4"=1 Ft.

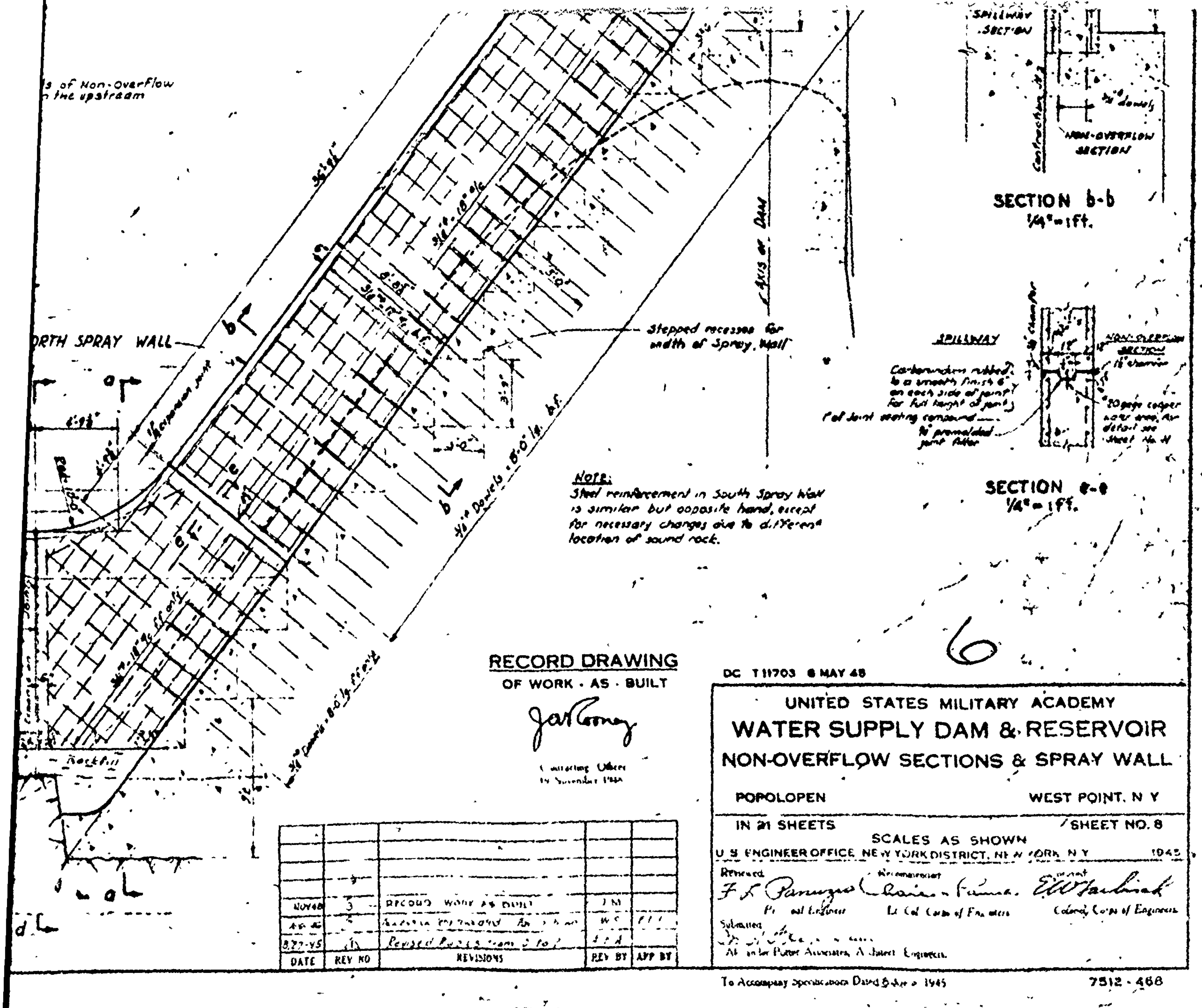
D-D

D₁ Similar, ation of ground surfaces. Ft.


Construction Joint
Level
Slope 1:50
6'-0"
6" dia steel pressure relief pipes
Backfill
Assumed top soil
Bottom of rock excavation (Slope 1:50)
4" dia drill holes to depths as specified
SECTION C-C
1/4" = 1 ft.
SECTION f-f
1/2" premolded joint filler
1/2" chamfer
6" chamfer
North Spray Wall
EL 5725
SPILLWAY
NON-OVERFLOW SECTION
SPILLWAY SECTION
Backfill
Elevation d-d
SECTION a-a
1/4" = 1 ft.
20'-0"
EL 5730.2
For grading see General Plan
Assumed level of sound rock at back of wall
Assumed level of sound rock at face of wall
6" tile drains
South Training Wall at Buffet similar but opposite hand, except for location of rock
4

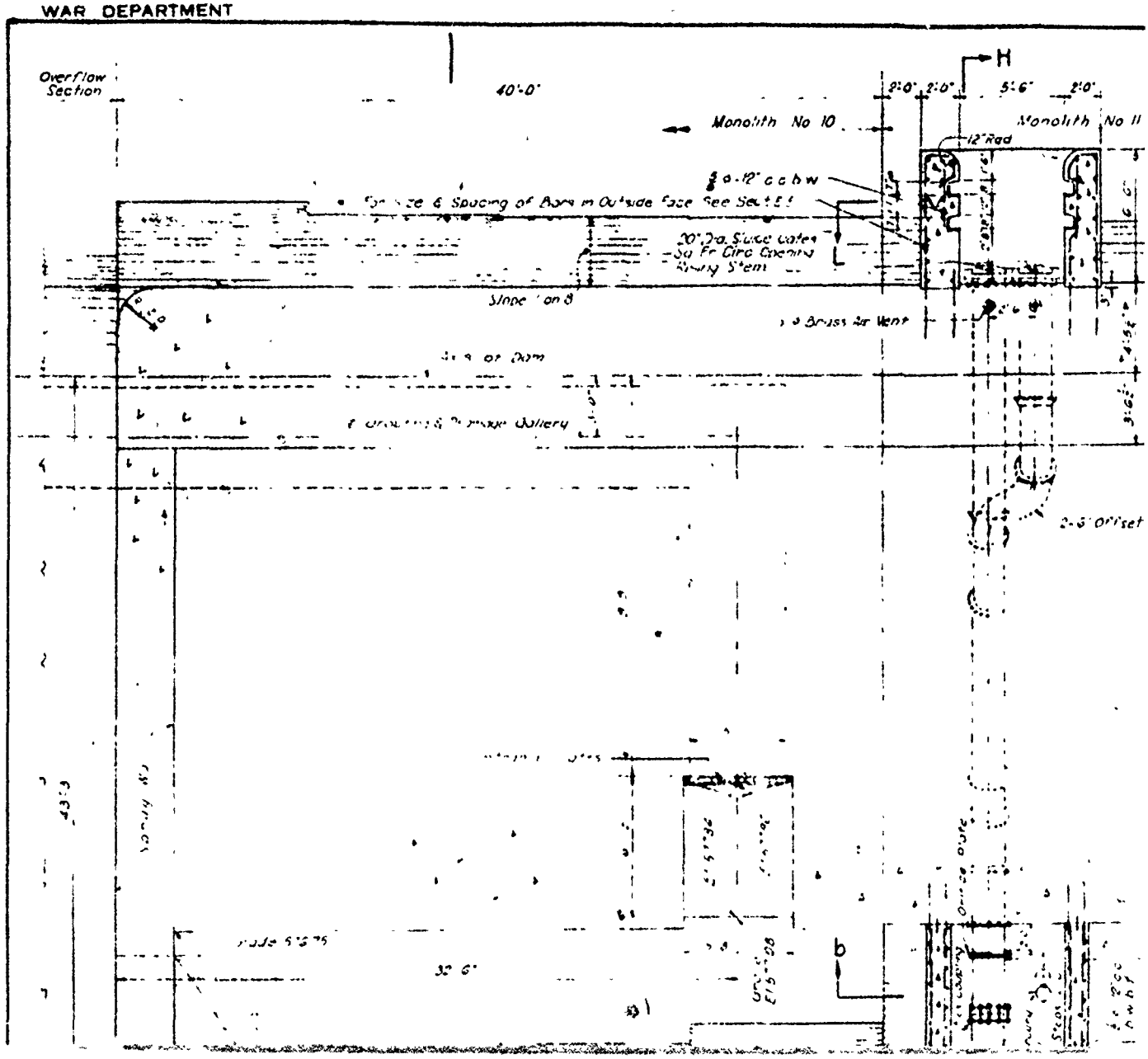


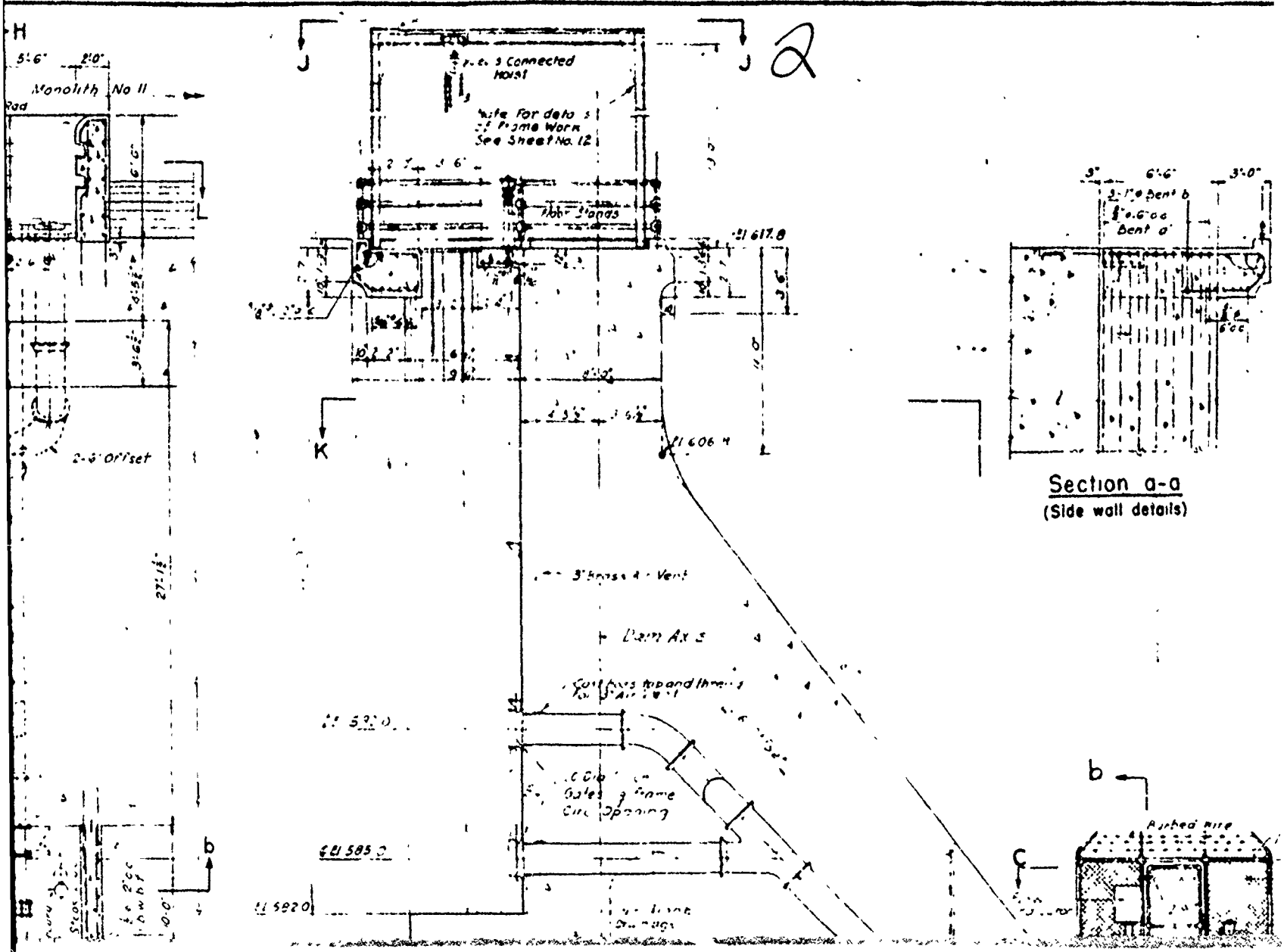
DATE	REV NO	REVISIONS
NOV 48	3	RECORD
8-27-45	1	Revised



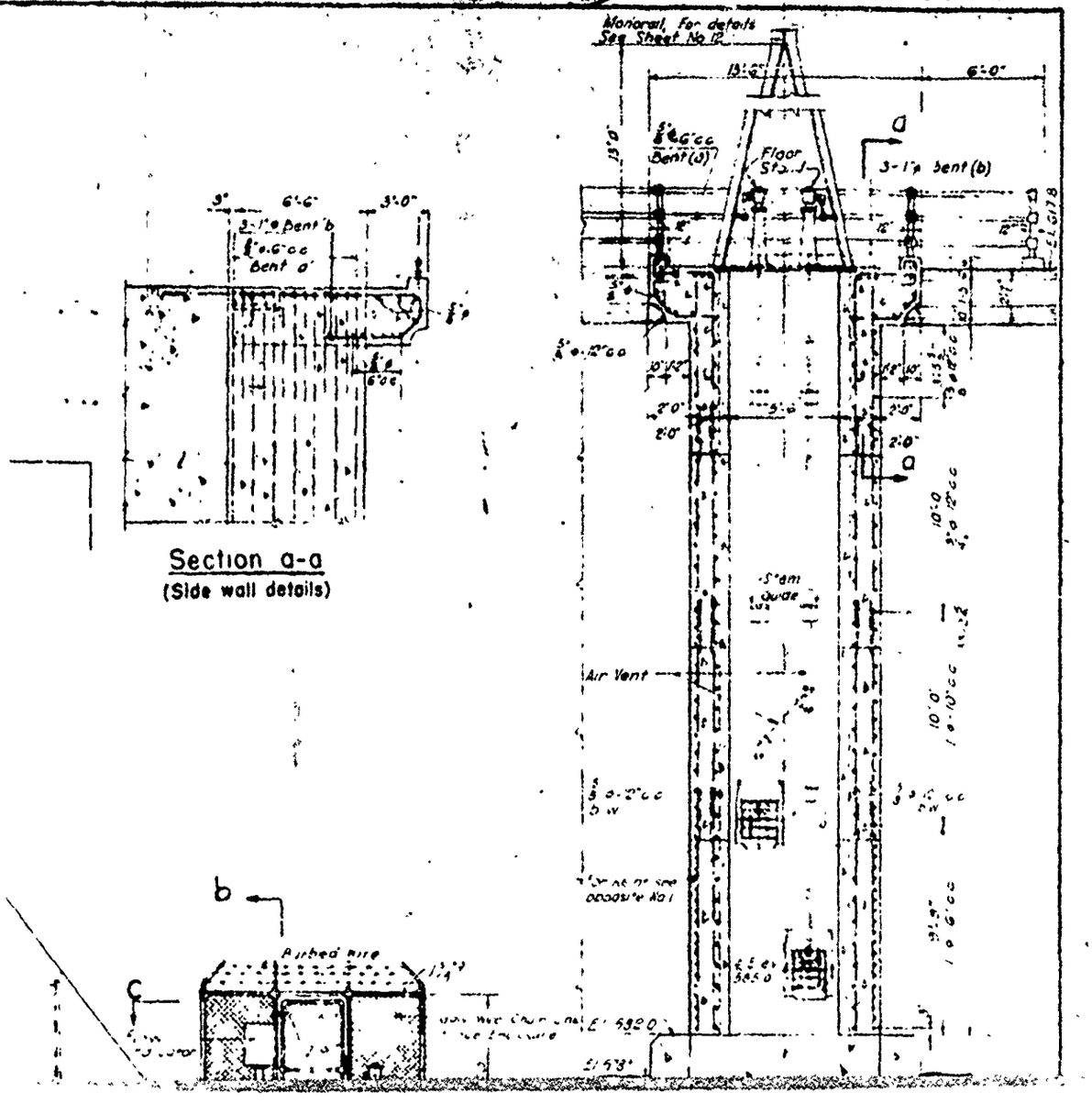
SECTION b-b
1/4" = 1 ft.
SPILLWAY SECTION
NON-OVERFLOW SECTION
Contraction Jt.
SECTION e-e
1/4" = 1 ft.
SPILLWAY
NON-OVERFLOW SECTION
Carborundum rubbed to a smooth finish 6" on each side of joint for full height of joint
Felt joint sealing compound
Premolded joint filler
20 gage copper water stop, for detail see Sheet No. 11
NORTH SPRAY WALL
AXIS OF DAM
Stepped recesses for width of Spray Wall
Note:
Steel reinforcement in South Spray Wall is similar but opposite hand, except for necessary changes due to different location of sound rock.
Backfill
RECORD DRAWING
OF WORK - AS - BUILT
Contracting Officer
DC T11703 6 MAY 48
UNITED STATES MILITARY ACADEMY
WATER SUPPLY DAM & RESERVOIR
NON-OVERFLOW SECTIONS & SPRAY WALL
POPOLOPEN
WEST POINT, N Y
IN 21 SHEETS
SHEET NO. 8
SCALES AS SHOWN
U S ENGINEER OFFICE, NEW YORK DISTRICT, NEW YORK, N Y
1945
RECORD WORK AS BUILT
DATE
REV NO
REVISIONS
REV BY
APP BY
To Accompany Specifications Dated
1945
7512-468
6

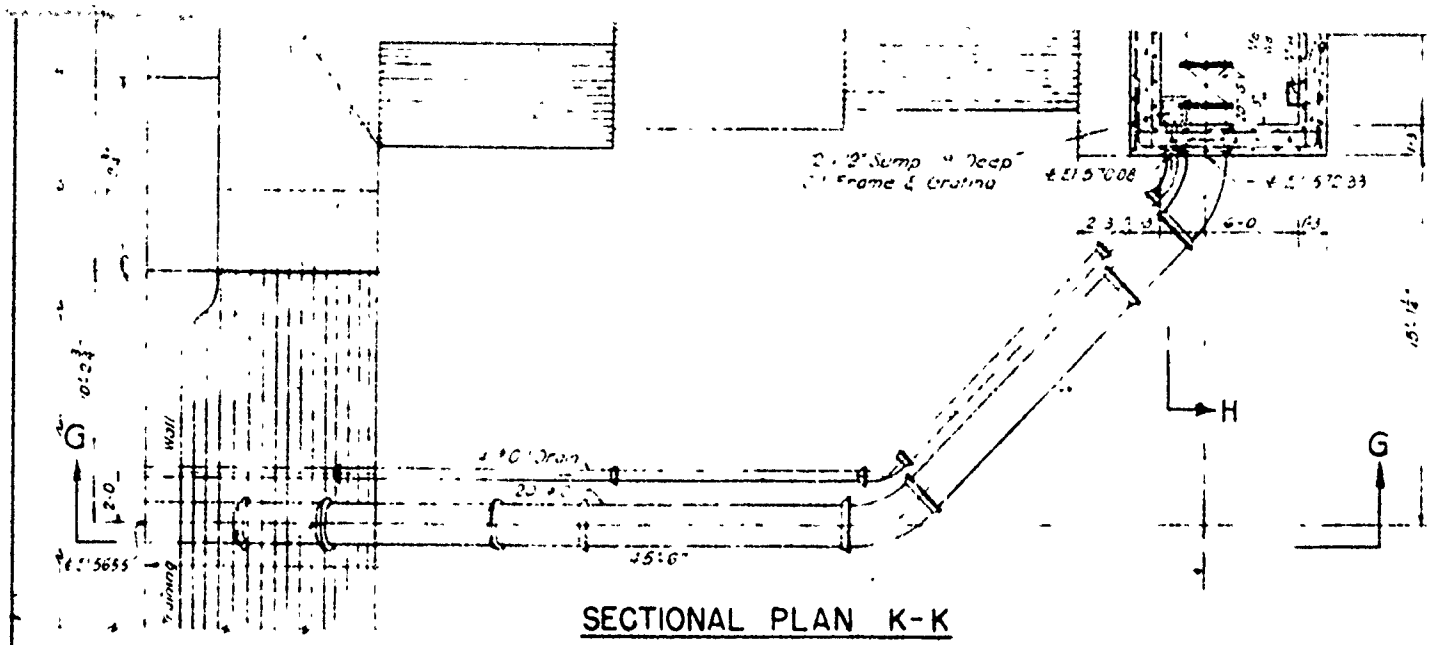
WAR DEPARTMENT



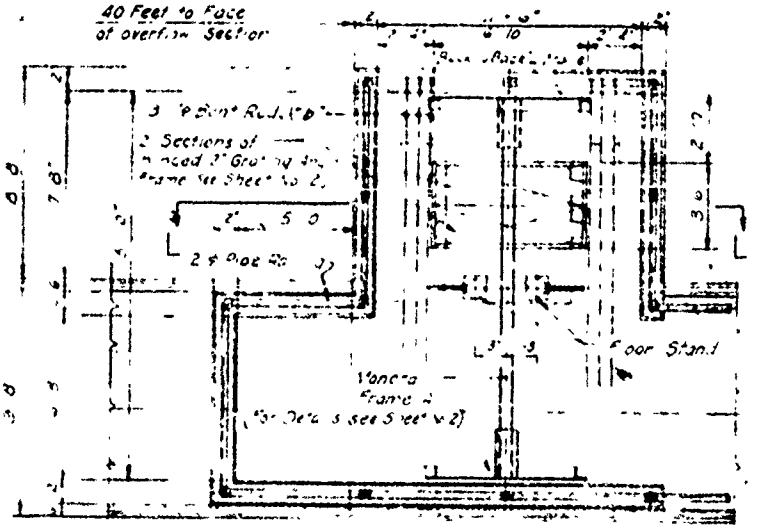

H
J
K
Monolith No 11
2-6" Offset
Note For details of Frame Work See Sheet No. 12
Rail Stands
Dam Axis
Gates & Frame
Circ Opening
Section a-a
(Side wall details)
Arched Ribs
b
C

CORPS OF ENGINEERS, U.S. ARMY

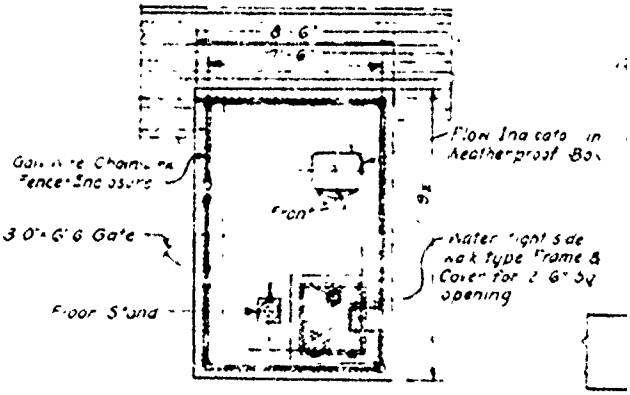




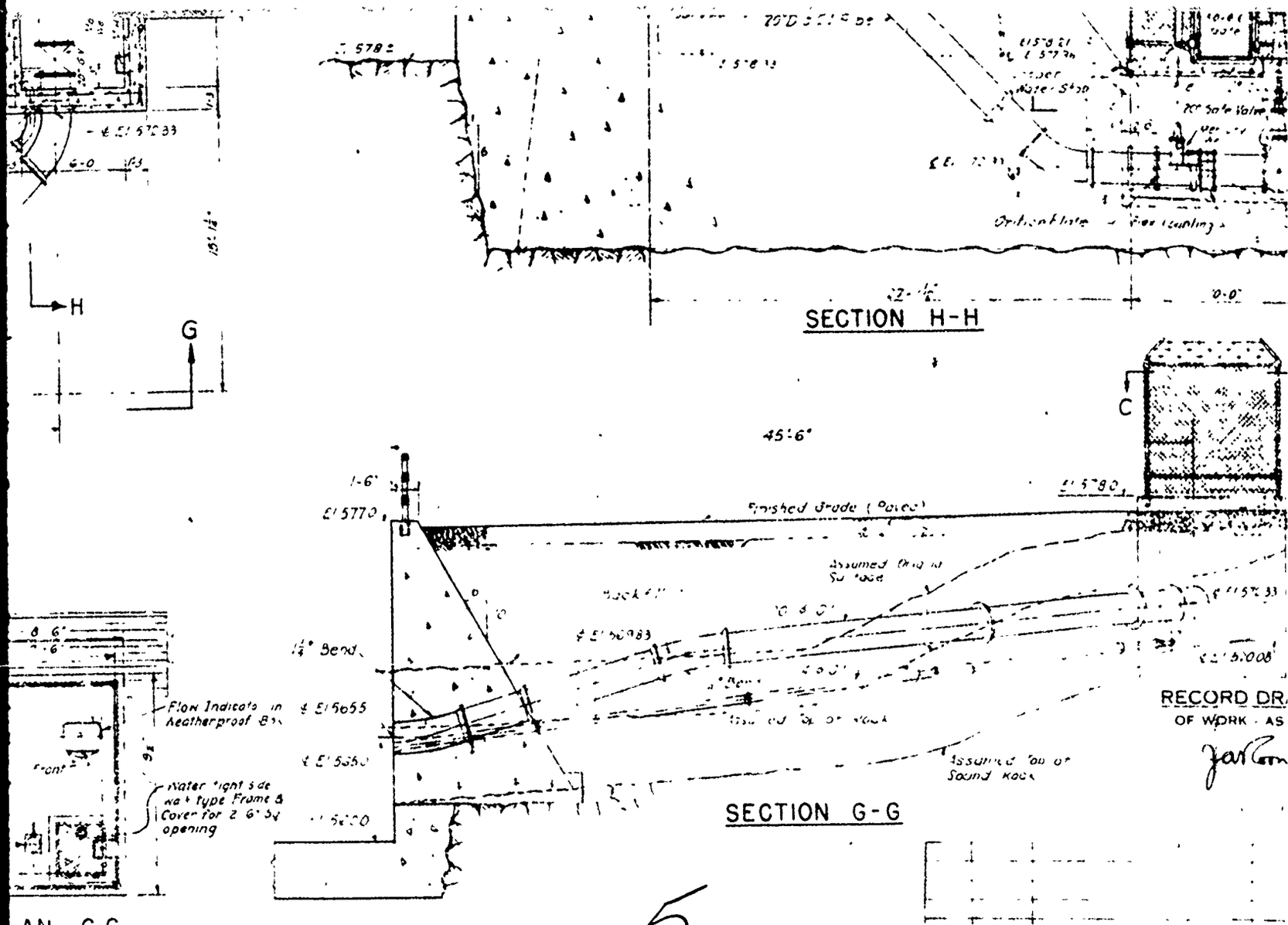
SECTIONAL PLAN K-K

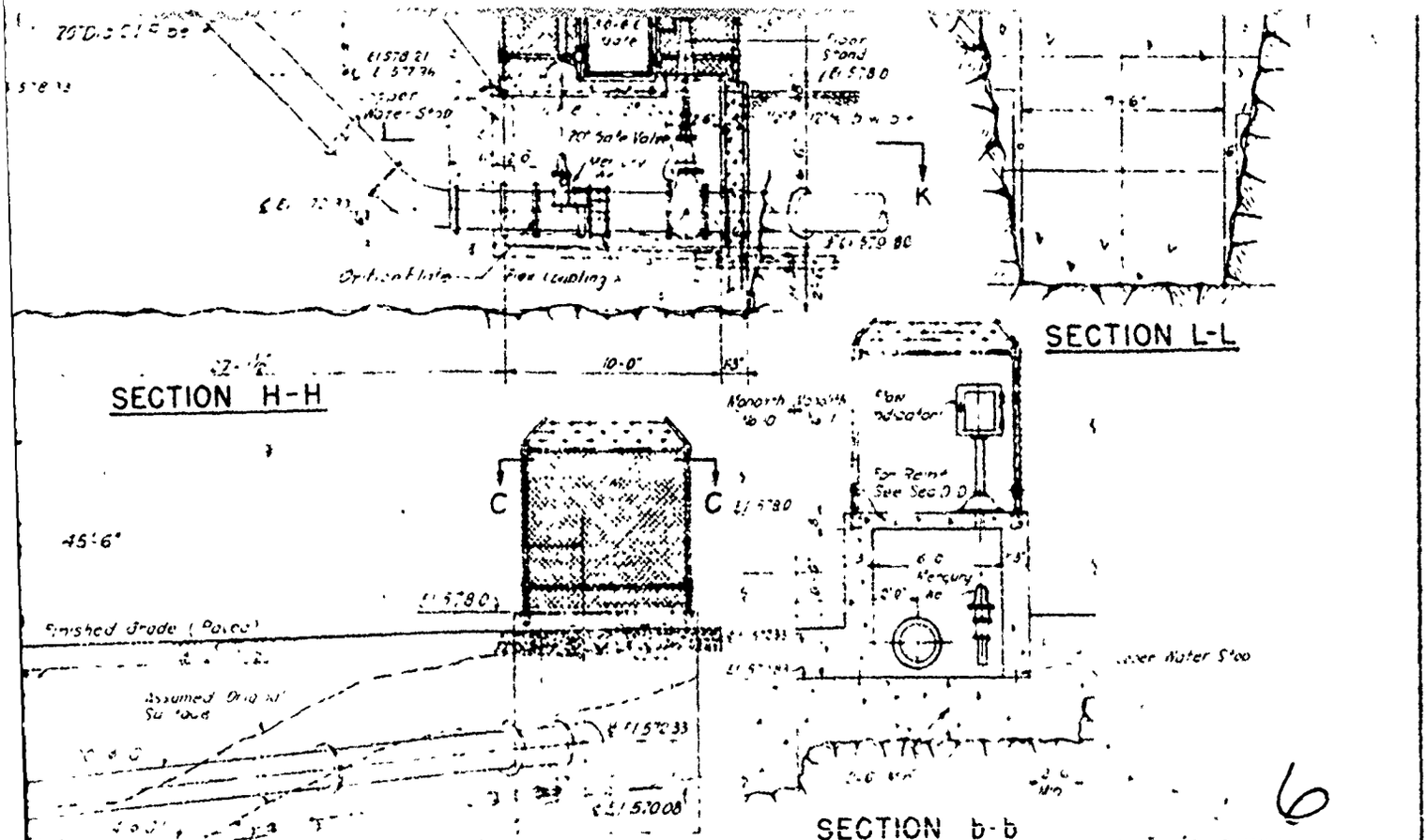


PLAN J-J



PLAN C-C


SECTION H-H
SECTION G-G
H
G
C
45'-6"
Finished Grade (Paved)
Assumed Grad of Surface
Assumed Top of Sound Rock
1/4" Bend
Flow Indicator in Weatherproof Box
Water tight side walk type Frame & Cover for 2'-6" x 4' opening
Front
AN C-C
Scale 1/4" = 1'-0"
5
DATE REV NO
REVISION
RECORD DR
OF WORK - AS



SECTION L-L

SECTION H-H

SECTION b-b

SECTION G-G

RECORD DRAWING
OF WORK - AS BUILT

DC F11703 8 MAY 45

UNITED STATES MILITARY ACADEMY

WATER SUPPLY DAM, & RESERVOIR

INTAKE AND DRAW-OFF DETAILS

POPOLOPEN — WEST POINT N Y

IN 21 SHEETS — SHEET NO 9

SCALES AS SHOWN

U.S. ENGINEER OFFICE NEW YORK DISTRICT NEW YORK N Y APR. 1946

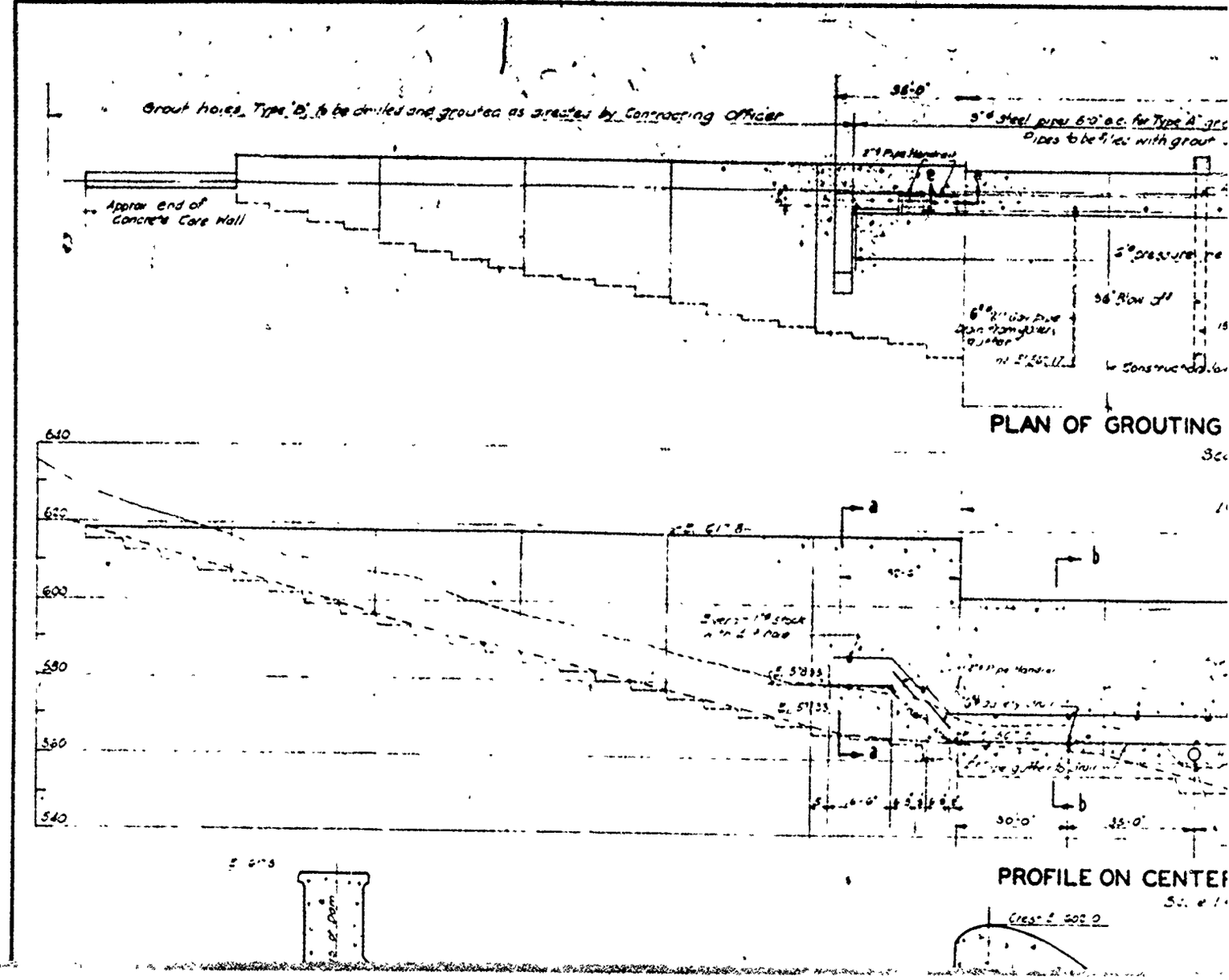
Submitted: Engineer — Recommended: Engineer — Approved: Colonel Corps of Engineers

DATE REV NO	REVISION	REV BY APP'D BY
12-48	Revised work as built	J.R.

To Accompany Specifications Dated 4 June 1945

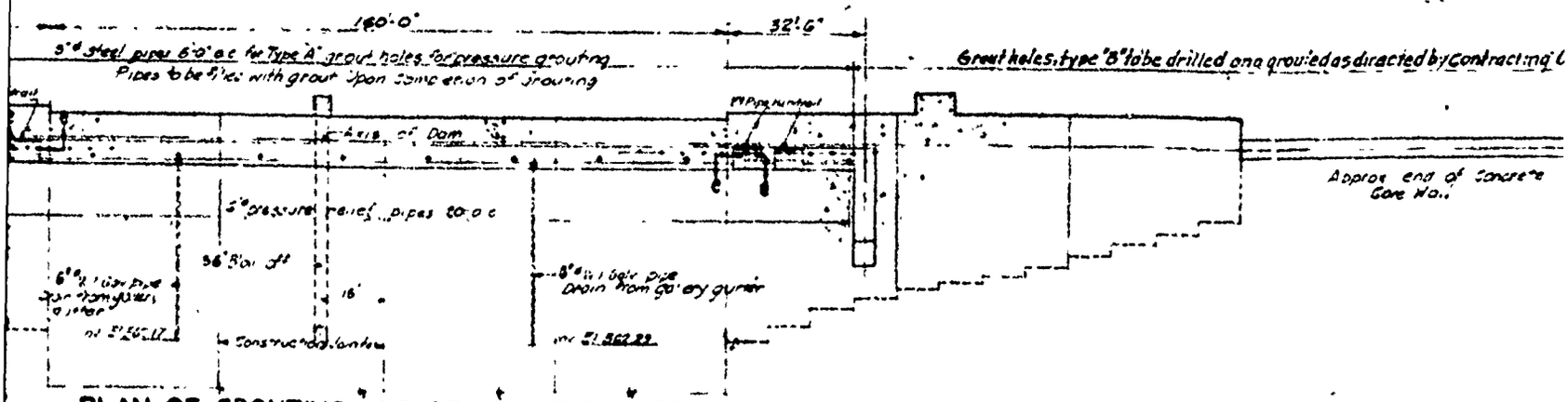
7512-4691

WAR DEPARTMENT



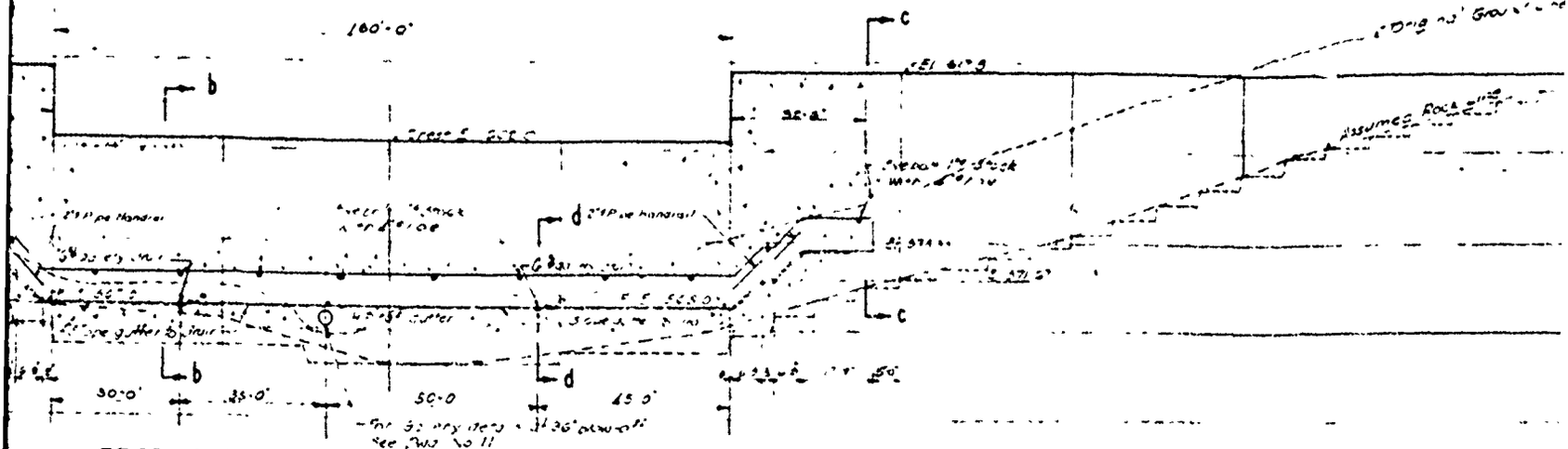
PLAN OF GROUTING

PROFILE ON CENTER



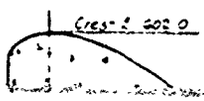
PLAN OF GROUTING AND DRAINAGE GALLERY

Scale 1:20'0"



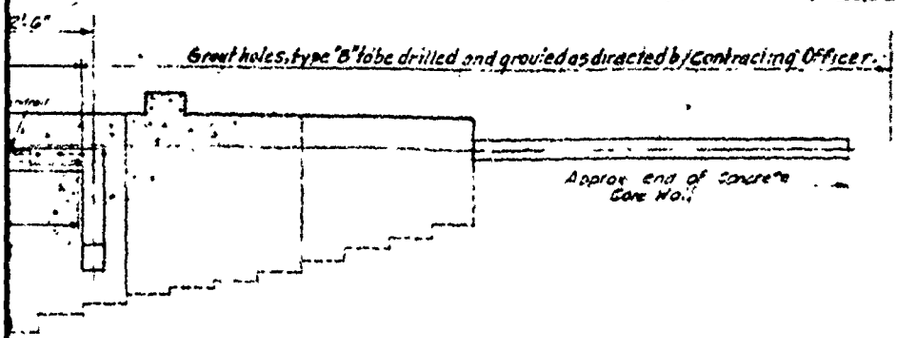
PROFILE ON CENTER LINE OF GALLERY

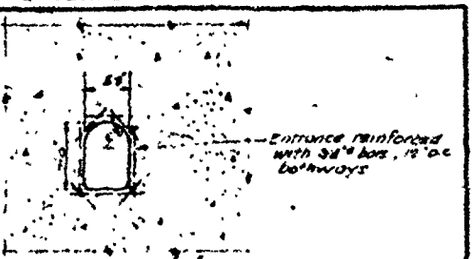
Scale 1"=20'-0"



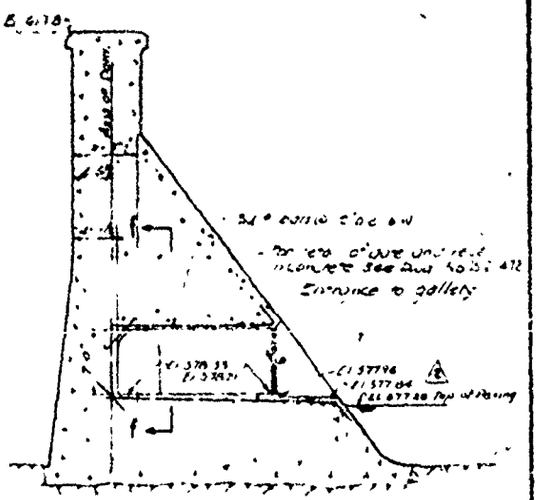
3

CORPS OF ENGINEERS U.S. ARMY

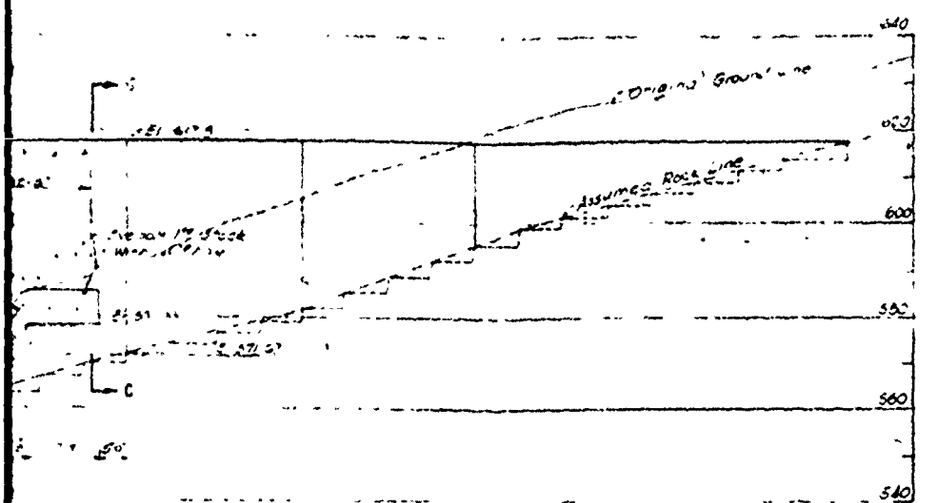


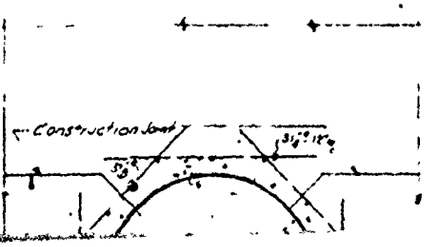


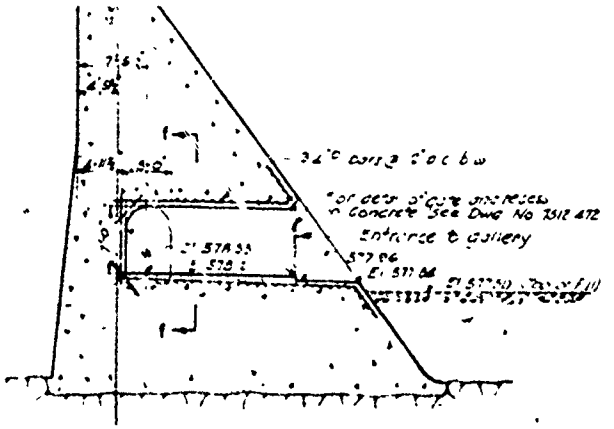
SECTION I-I
Scale 1" = 10'-0"



SECTION C-C
Scale 1" = 10'-0"

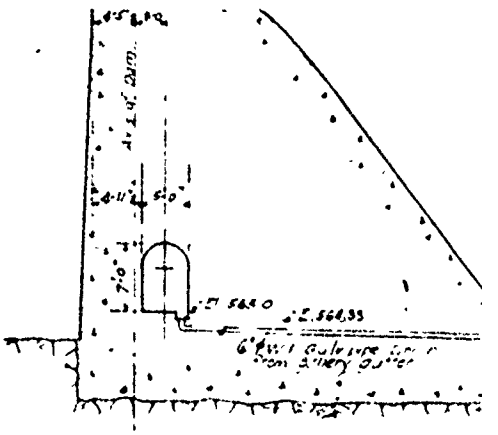






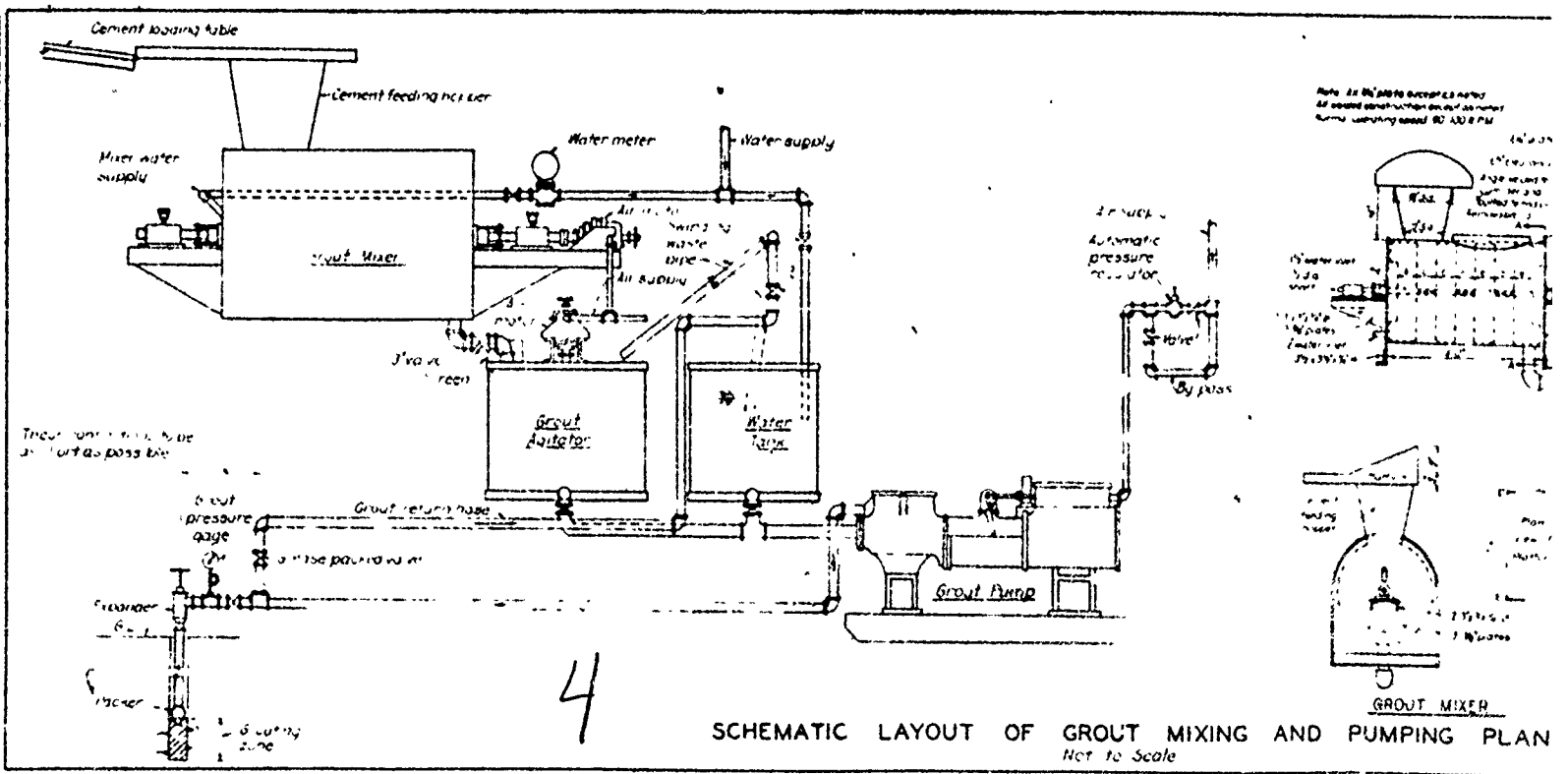
SECTION a-a

Scale 1:10:0"



SECTION b-b

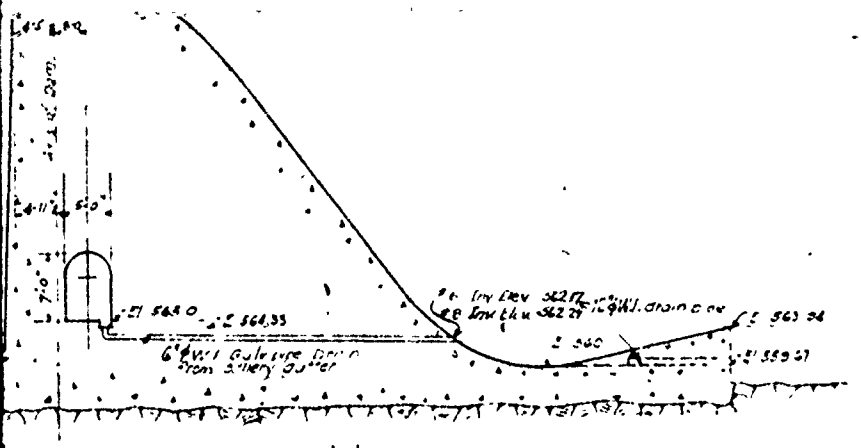
Scale 1:10:0"



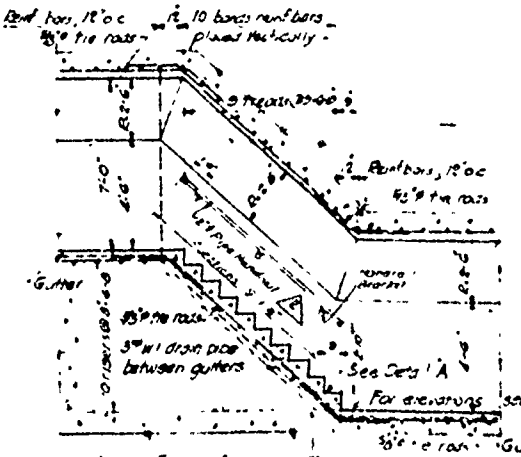
4

SCHEMATIC LAYOUT OF GROUT MIXING AND PUMPING PLAN

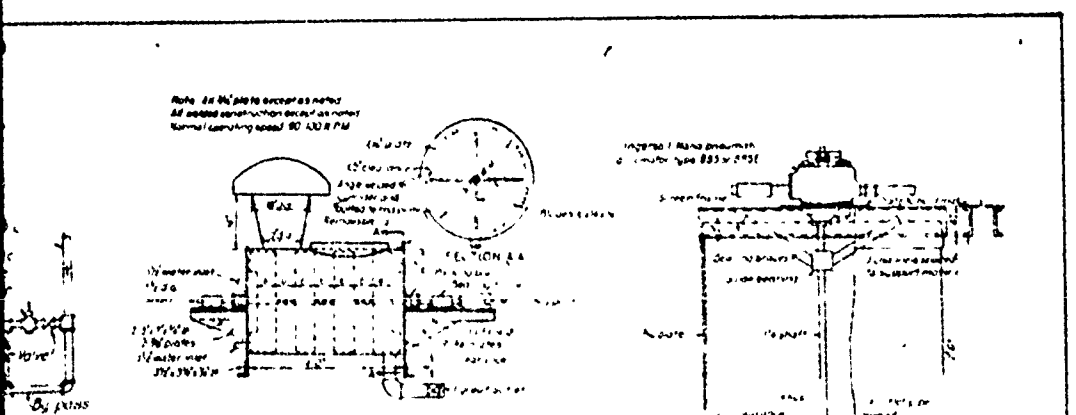
Not to Scale



SECTION b-b
Scale 1:10:0"



SECTION e-e
Typical Stair Details
4 flights of stairs required as shown
Scale ½" = 1'-0"

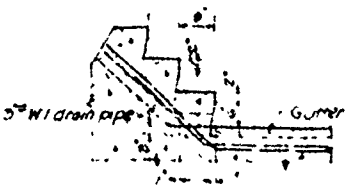


GROUT MIXER

GROUT AGITATOR

MIXING AND PUMPING PLANT

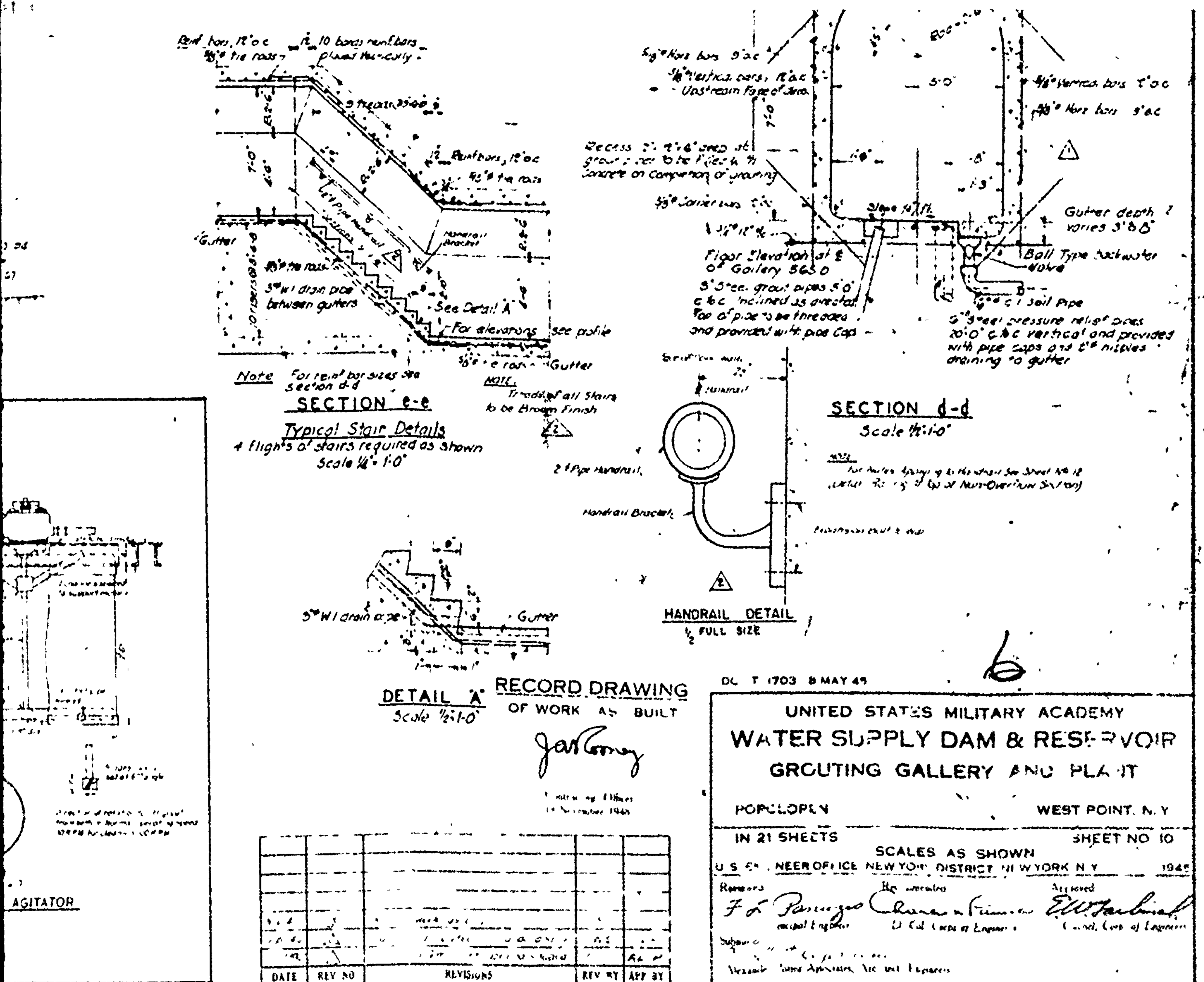
5



DETAIL 'A'
Scale ½:1-0"

RECORD DRAWING
OF WORK AS BUILT

DATE	REV NO	REVISIONS	REV BY	APP BY



RECORD DRAWING
OF WORK AS BUILT

Contracting Officer
14 November 1946

DC T 1703 8 MAY 45

UNITED STATES MILITARY ACADEMY
WATER SUPPLY DAM & RESERVOIR
GROUTING GALLERY AND PLANT

POPOLOPEN — WEST POINT, N. Y.

IN 21 SHEETS — SHEET NO 10

SCALES AS SHOWN

U.S. ENGINEER OFFICE NEW YORK DISTRICT NEW YORK N.Y. 1945

Reviewed — Recommended — Approved

Principal Engineer — Lt. Col. Corps of Engineers — Colonel, Corps of Engineers

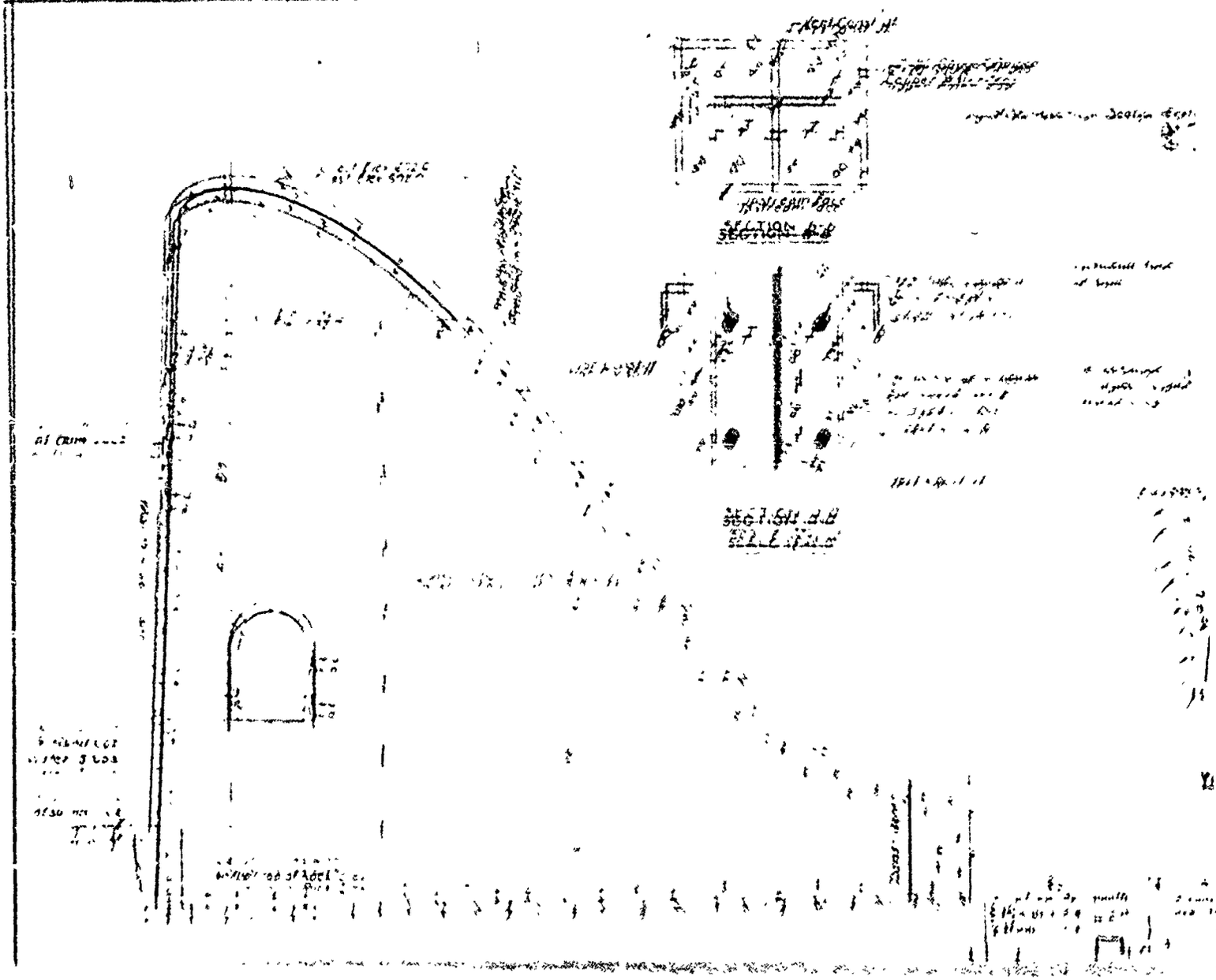
Alexander Potter Associates, Architect Engineers

DATE	REV NO	REVISIONS	REV BY	APP BY

To Accompany Specifications Dated June 1945

7512 - 470

WAR DEPARTMENT



2

0 Gauge Crimped
er Water Stop

Top of Non-Overflow Section El 617.8

Holes spaced at
c except as
wn at joints

0 Gauge unnealed
copper strip
ped as shown
ction b-b

Const Jt

Upstream face
of Dam

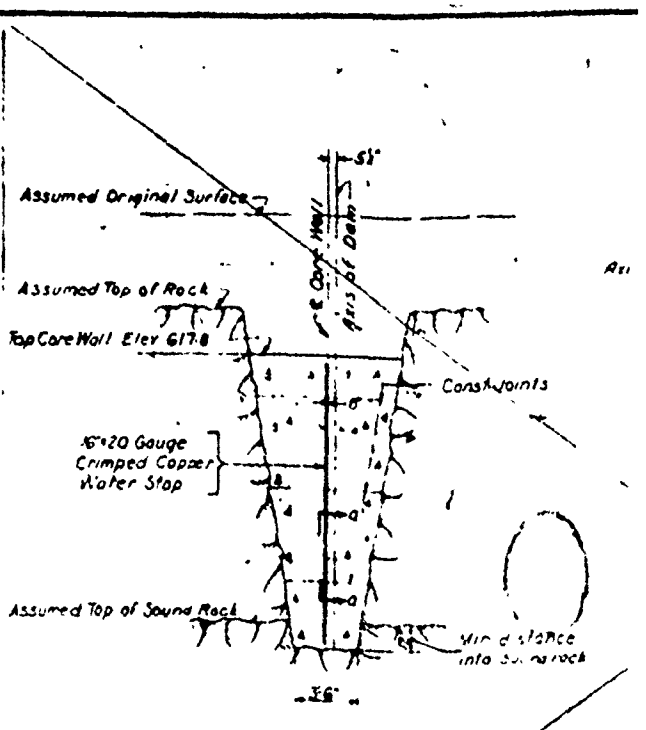
6"x20 Gauge
Crimped Copper
Water Stop

Const Jts

Elev 592.0

Slope 1:0

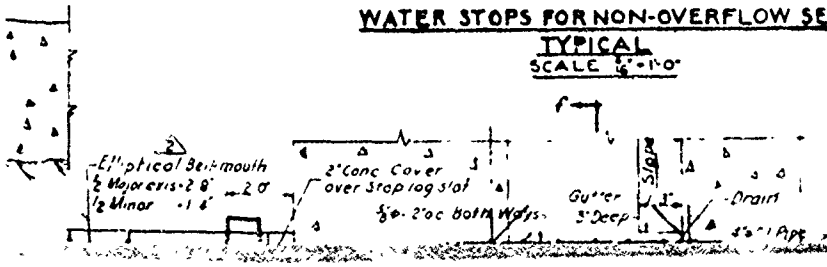
Length varies with
ac... Top of Rock Elev



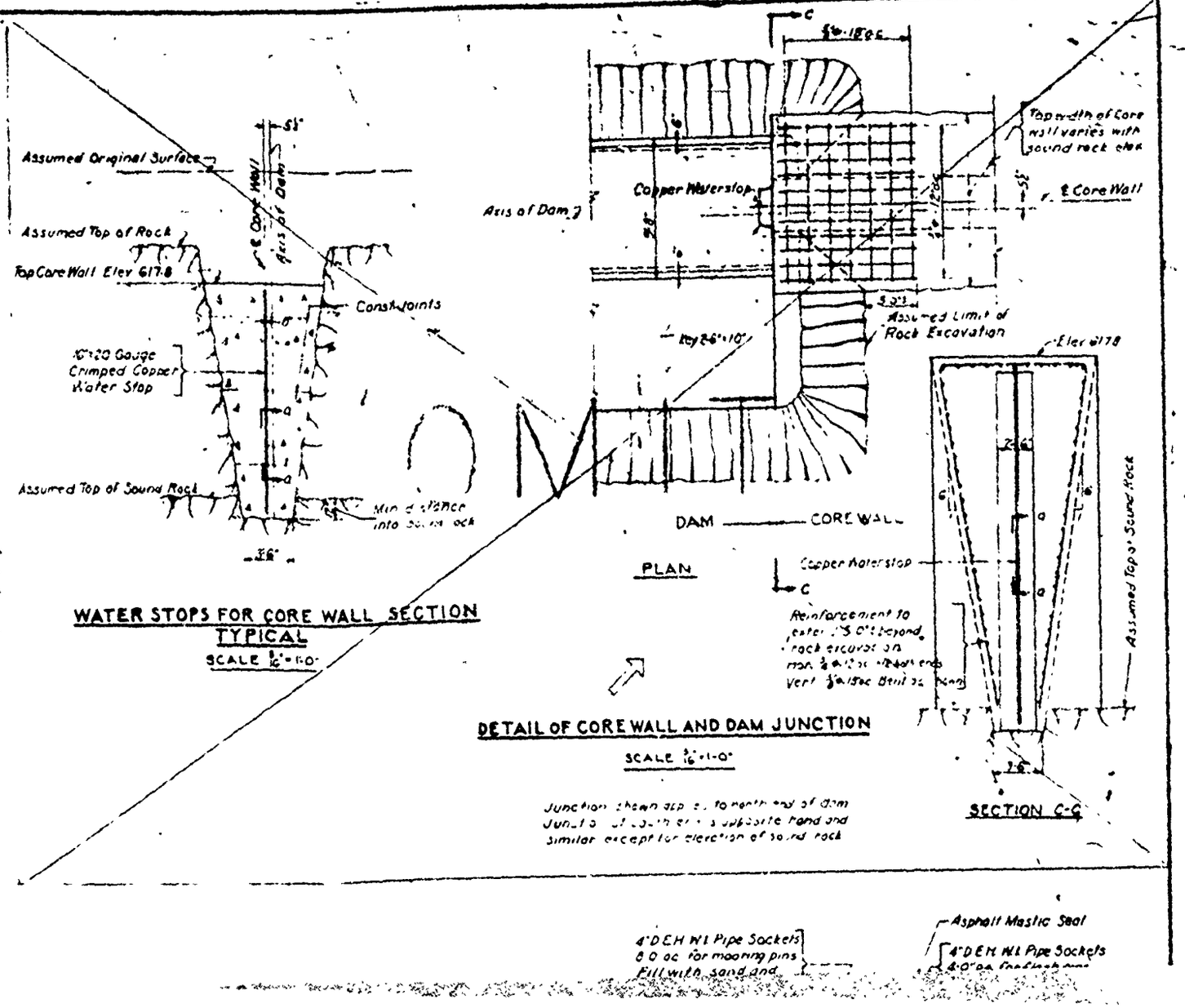
WATER STOPS FOR CORE WALL SECTION
TYPICAL
SCALE 1/2"=1'-0"

DE

WATER STOPS FOR NON-OVERFLOW SECTION
TYPICAL
SCALE 1/2"=1'-0"



3 - CORPS OF ENGINEERS. U.S. ARMY



WATER STOPS FOR CORE WALL SECTION TYPICAL

SCALE 1/2"=1'-0"

DETAIL OF CORE WALL AND DAM JUNCTION

SCALE 1/2"=1'-0"

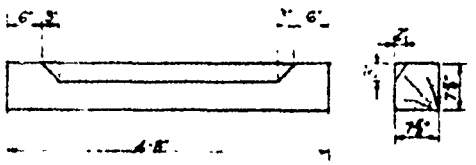
Junction shown at ... to north end of dam. Junction at south end is opposite hand and similar except for elevation of sound rock

4" D.E.H. W.I. Pipe Sockets @ 0.0 oc for mooring pins. Fill with sand and

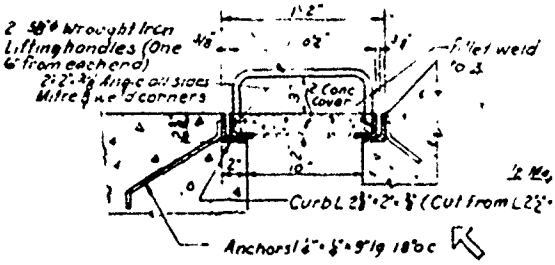
Asphalt Mastic Seal

4" D.E.H. W.I. Pipe Sockets

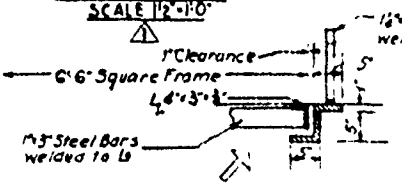
WATER STOPS FOR OVERFLOW SECTION
TYPICAL
SCALE: 3"=1'-0"



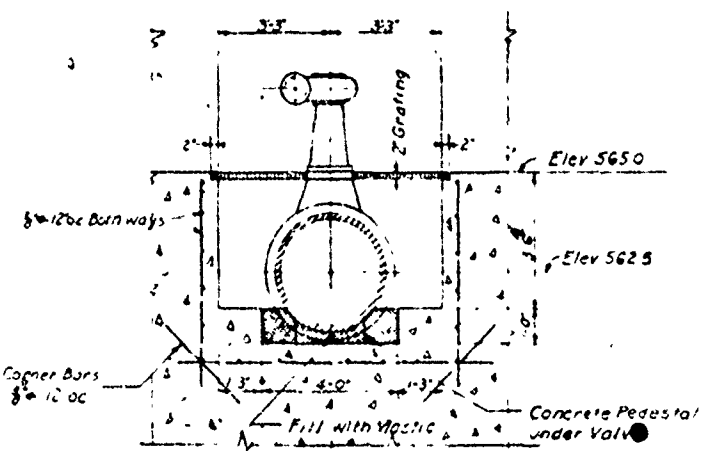
STOP LOG DETAIL
SCALE 3"=1'-0"



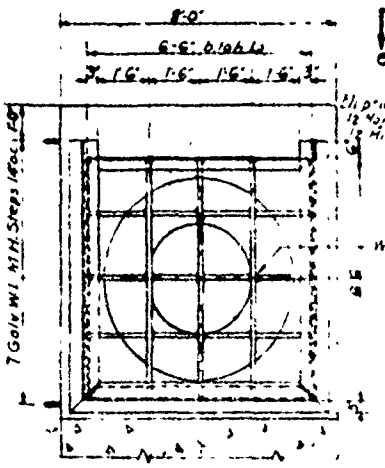
SECTION n-n
SCALE 1 1/2"=1'-0"



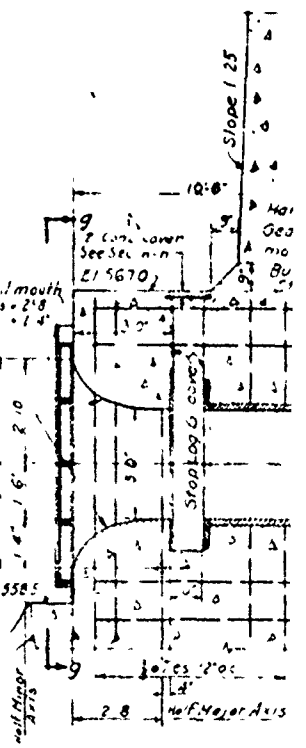
FRAME DETAIL
SCALE 3"=1'-0"



SECTION f-f

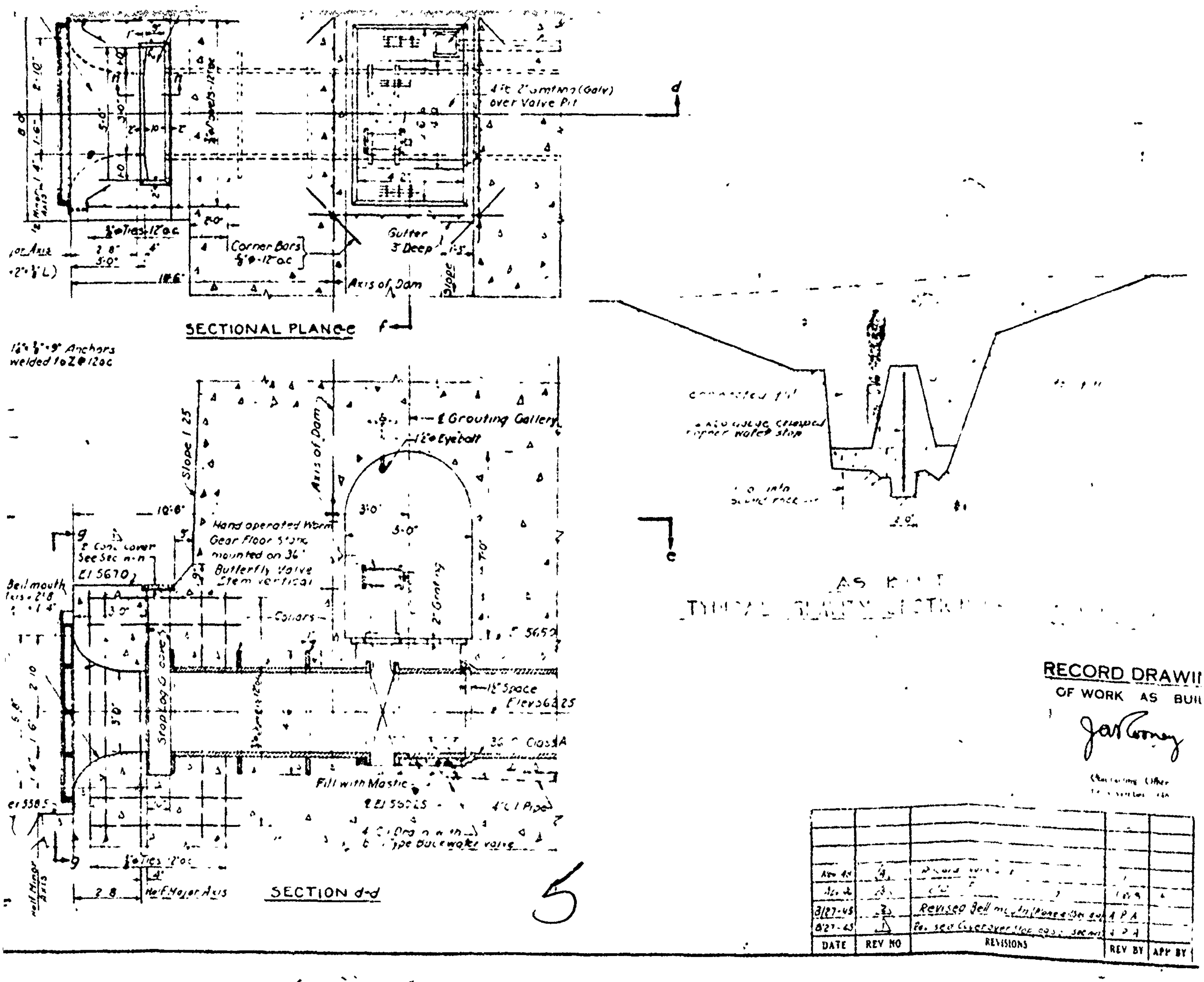


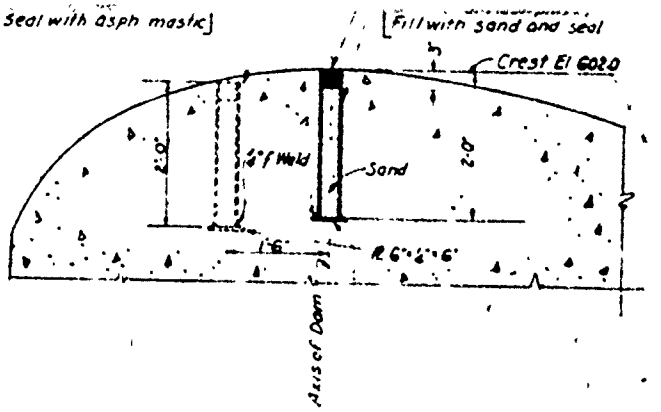
ELEVATION g-g



4

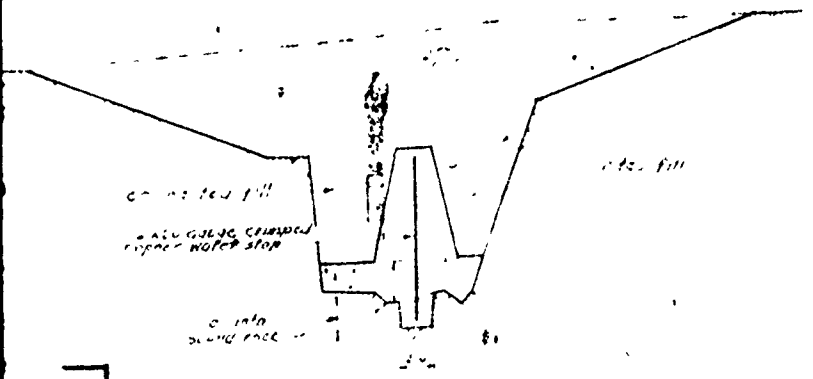
DETAILS OF BLOW-OFF
SCALE 3/8"=1'-0 EXCEPT AS NOTED


SECTIONAL PLANE e-e
Corner Bars
Gutter
3" Deep
Axis of Dam
over Valve Pit
Grouting Gallery
Eyebolt
Slope 1.25
Hand operated Worm Gear Floor Stand mounted on 36" Butterfly Valve Stem vertical
Bellmouth
Collars
Space
Fill with Mastic
SECTION d-d
Half Major Axis
RECORD DRAWI
OF WORK AS BUI
Revised Bell m
DATE
REV NO
REVISIONS
REV BY
APP BY
5



DETAIL OF FLASHBOARD SOCKETS

SCALE- 1"=1'-0"



RECORD DRAWING
OF WORK - AS BUILT

Operating Officer
15 November 1945

DC T 11703 8 MAY 45

UNITED STATES MILITARY ACADEMY

WATER SUPPLY DAM & RESERVOIR

WATER STOPS, BLOW-OFF & MISC. DETAILS

POPOLOPEN — WEST POINT N. Y.

IN 21 SHEETS — SHEET NO 11

SCALES AS SHOWN

U S ENGINEER OFFICE NEW YORK DISTRICT, NEW YORK N Y 1945.

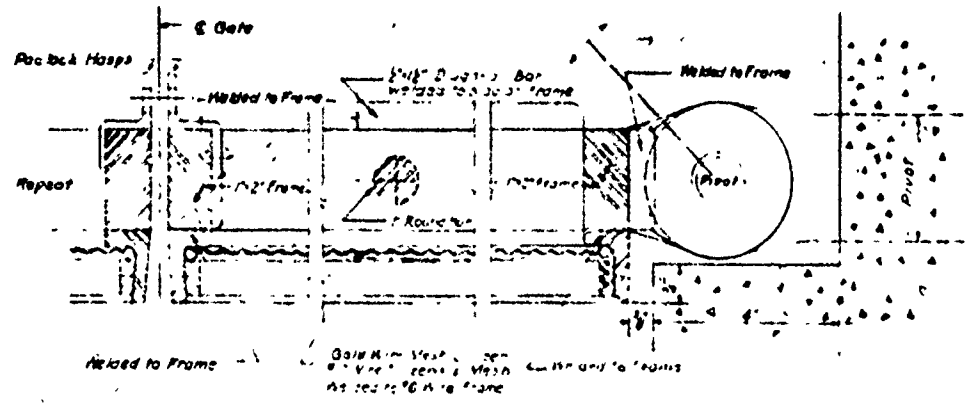
Recommended
Lt Col Corps of Engineers

Approved
Colonel Corps of Engineers

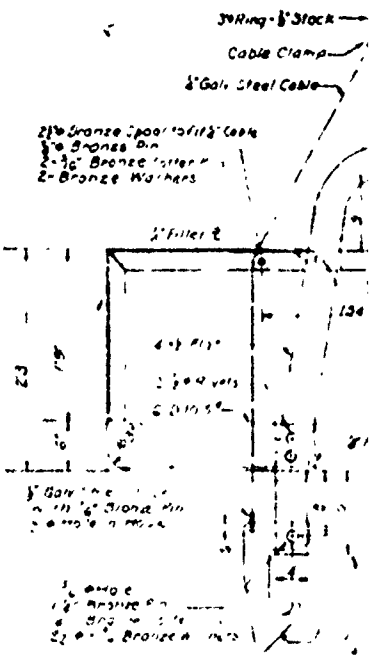
DATE	REV NO	REVISIONS	REV BY	APP BY
3/27-45	2	Revised Bell mouth (none either end)	A P A	
8/27-45	3	Revised Overflow Stop logs (3 sections)	A P A	

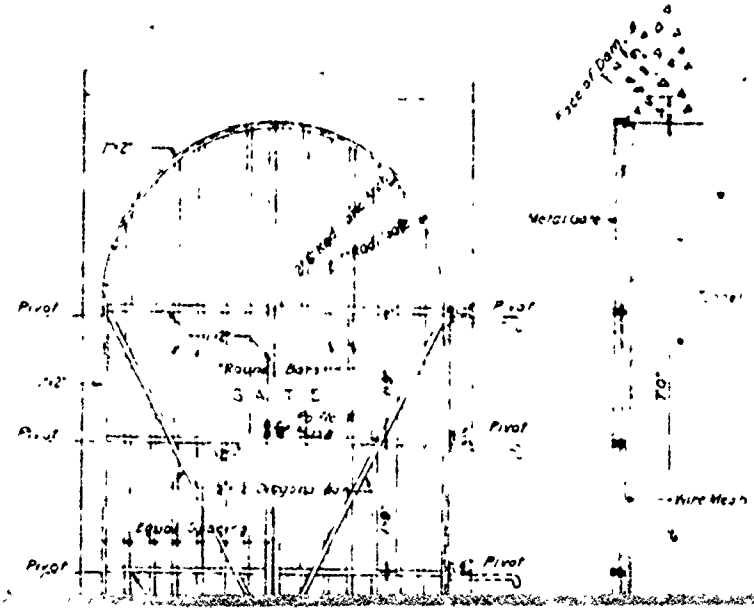
7512 - 471

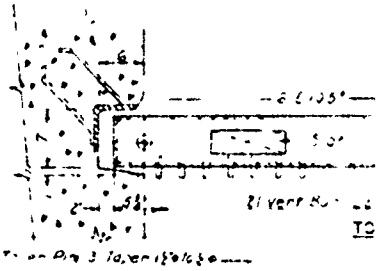
WAR DEPARTMENT

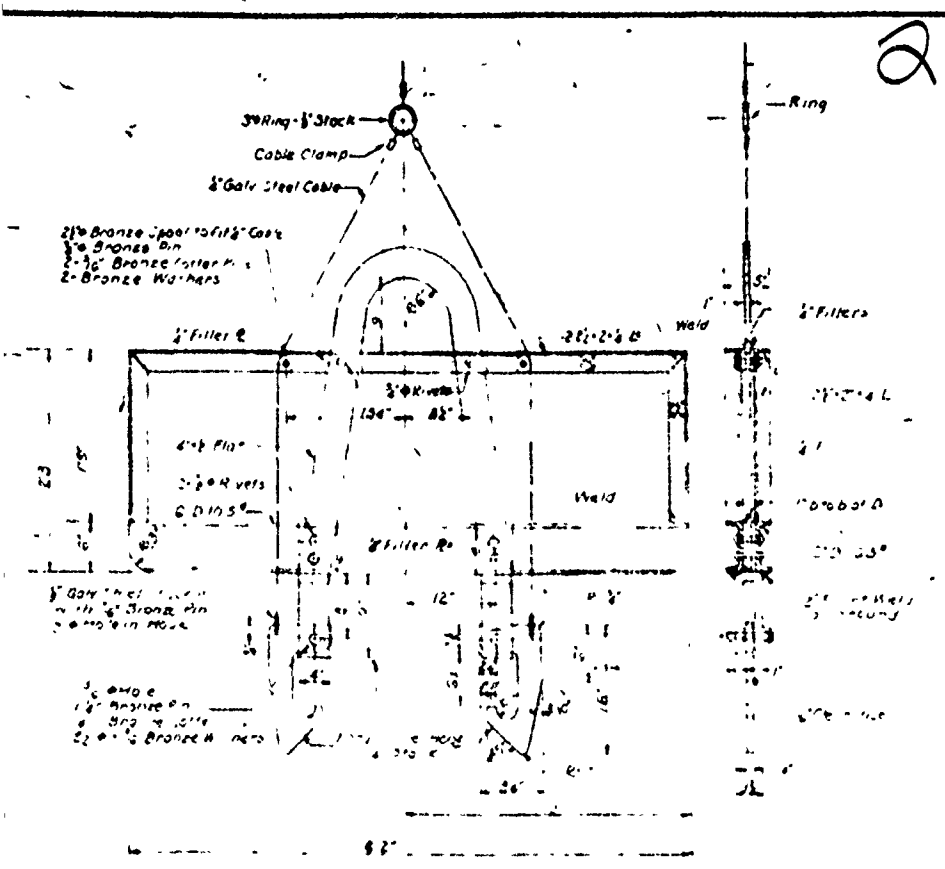


DETAIL OF GATE

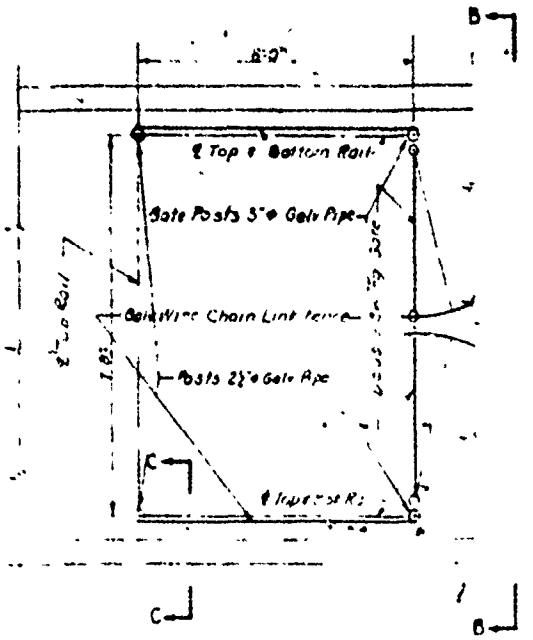






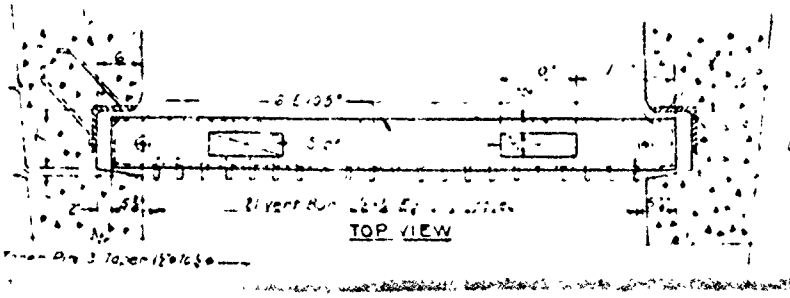


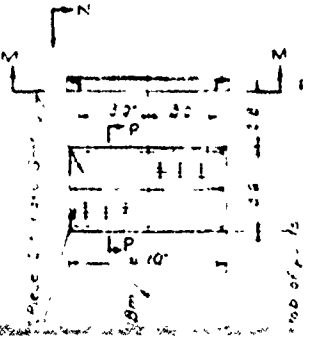
SCREEN LIFTER



PLAN

WIRE CHAIN LIN

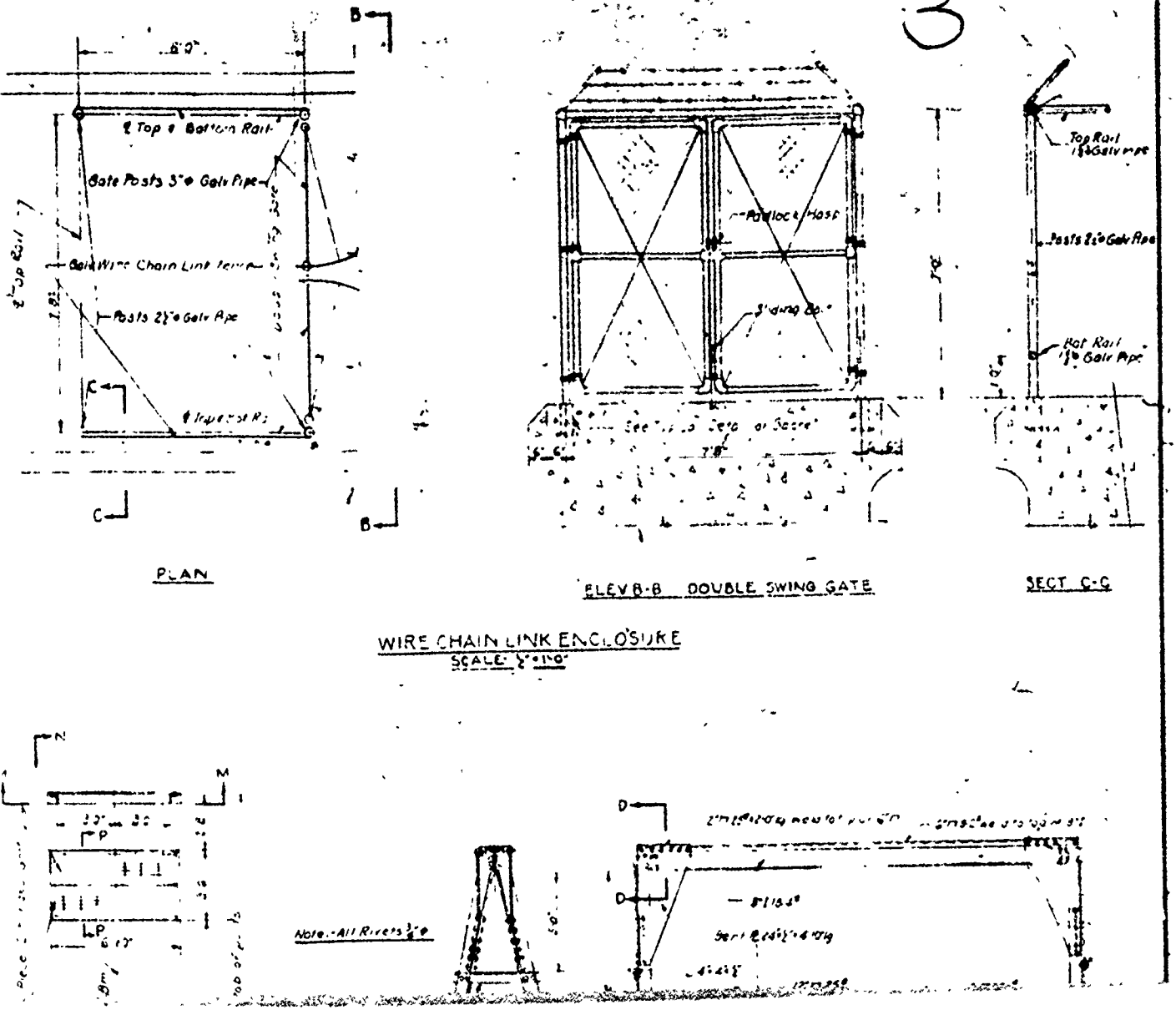




Note - All Rivets

CORPS OF ENGINEERS, U. S. ARMY

3



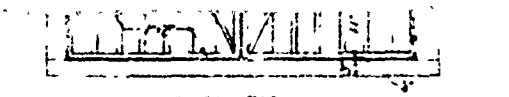
PLAN

ELEV B-B DOUBLE SWING GATE

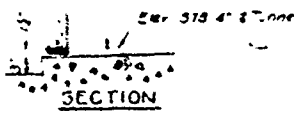
SECT C-C

WIRE CHAIN LINK ENCLOSURE

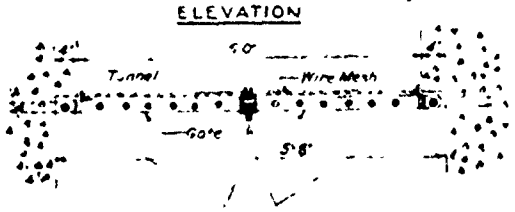
SCALE: 1"=10'



ELEVATION



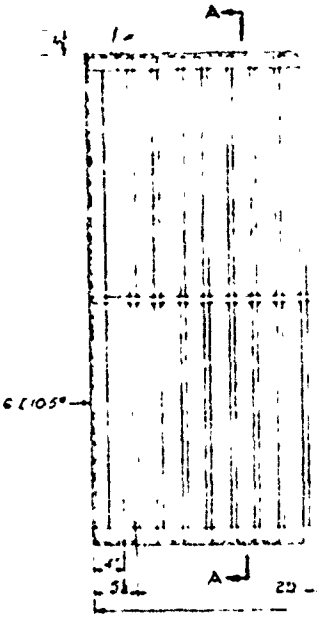
SECTION

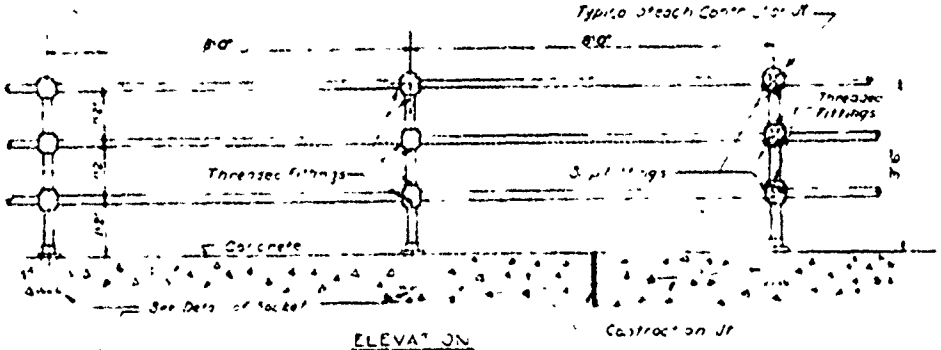


PLAN

DETAILS OF GATE AT ENTRANCE TO DRAINAGE GALLERY

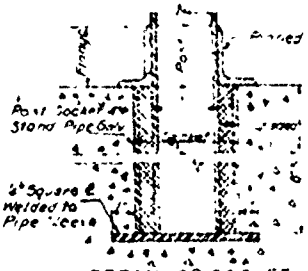
SCALE- ¾"=1'-0"





ELEVATION

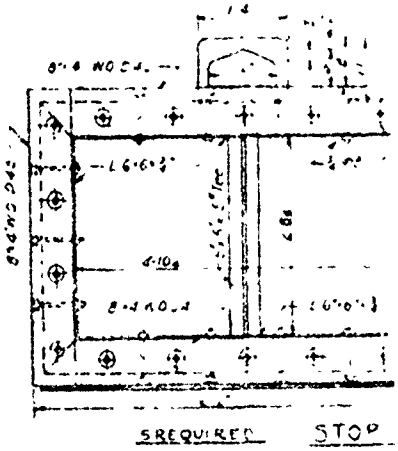
SCALE ¾"=1'-0"



DETAIL OF SOCKET AT BOTTOM OF EACH POST

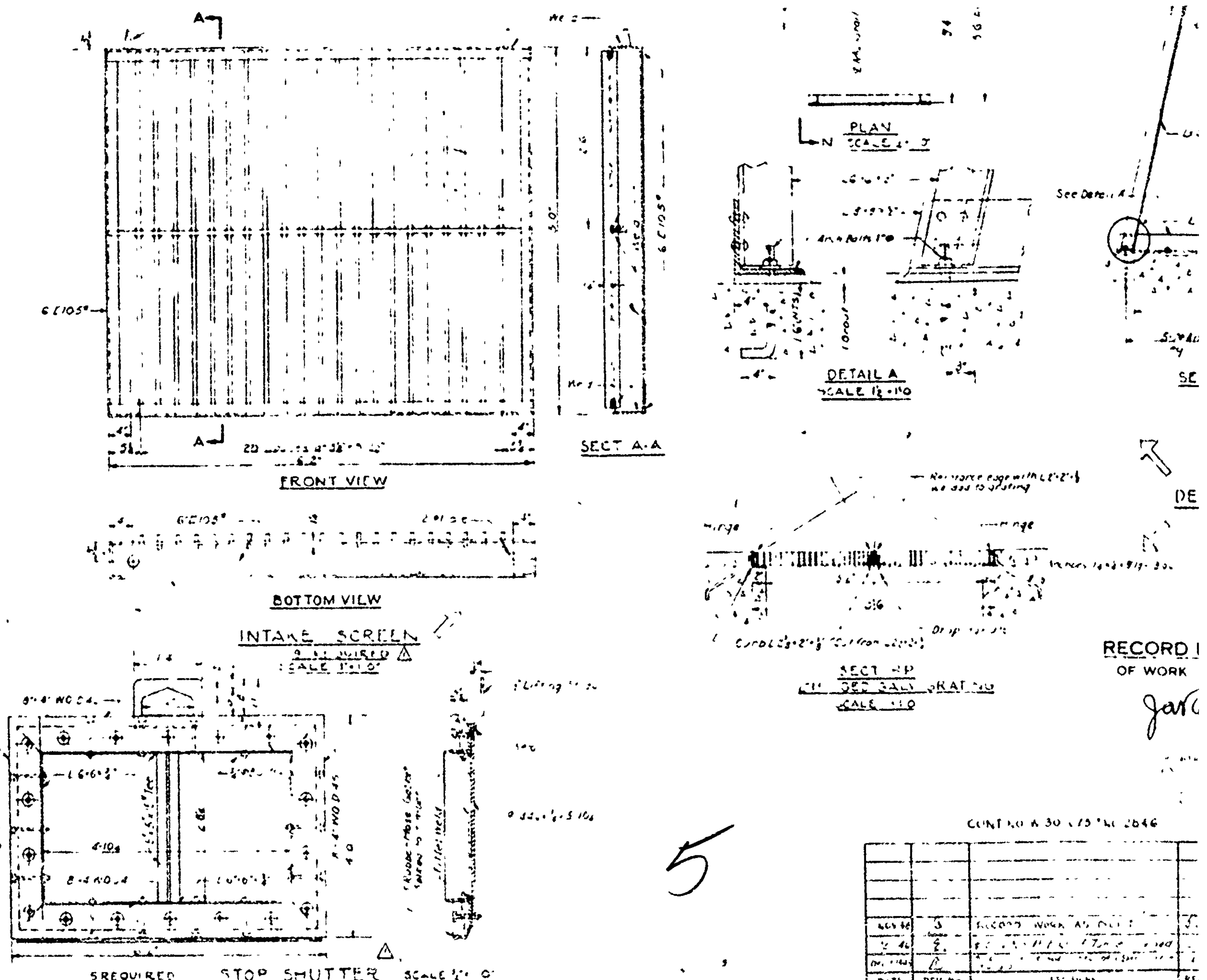
SCALE 3"=1'-0"

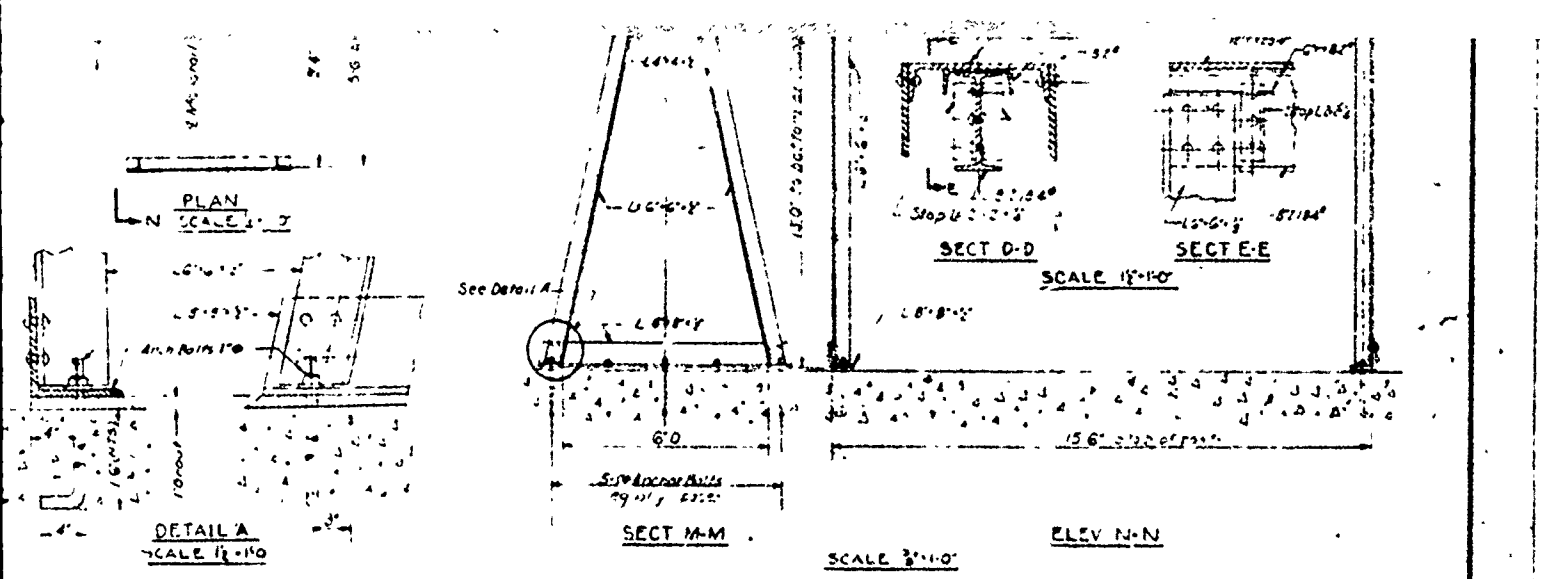
All pipes & fittings shall be galvanized after cutting & threading.
All pipe & fittings shall be galvanized after cutting & threading.
Samples of fittings shall be submitted for approval



4

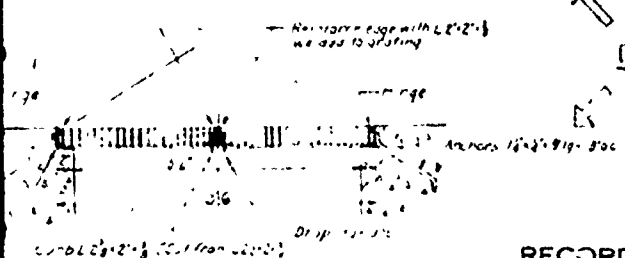
DETAILS OF RAILING AT TOP OF NON-OVERFLOW SECTIONS


FRONT VIEW
SECT A-A
BOTTOM VIEW
INTAKE SCREEN
PLAN
DETAIL A
See Detail A
SECT
RECORD
OF WORK
STOP SHUTTER
5 REQUIRED
CONT NO A 30 (75 NC 2646
DATE
REV No
REVISIONS
5



DETAILS OF HOIST FRAME AND GRAT[illegible] OVER INTAKE SCREEN

SCALE - AS SHOWN



RECORD DRAWING
OF WORK - AS BUILT

DC T 11703 8 MAY 45

UNITED STATES MILITARY ACADEMY

WATER SUPPLY DAM & RESERVOIR

MISCELLANEOUS DAM APPURTENANCES

POPOLOPEN — WEST POINT, N Y

IN 21 SHEETS — SHEET NO 12

SCALES AS SHOWN

U S ENGINEER OFFICE NEW YORK DISTRICT NEW YORK N Y — 1945

Recommended: [illegible] Principal Engineer; [illegible] Chief Civil Div of Engineers

Approved: [illegible] Colonel Corps of Engineers

[illegible] Assistant Post Engineer

CONT NO W 30 073 ENG 2646

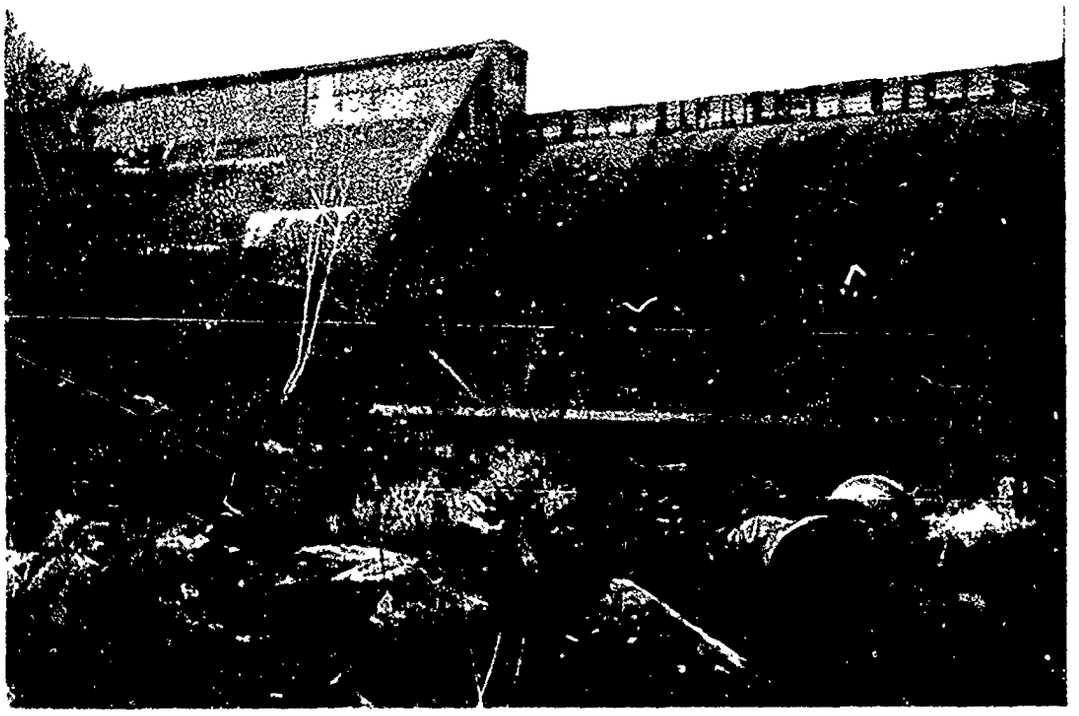
DATE	REV NO	REVISIONS	REV BY	APP BY
	3	RECORD WORK AS BUILT	JJM	
	2	[illegible] End of Tunnel revised	JMS	
	1	[illegible]	CDC	FLP

To Accompany Specification D[illegible]

7512 - 472

PHOTOGRAPHS

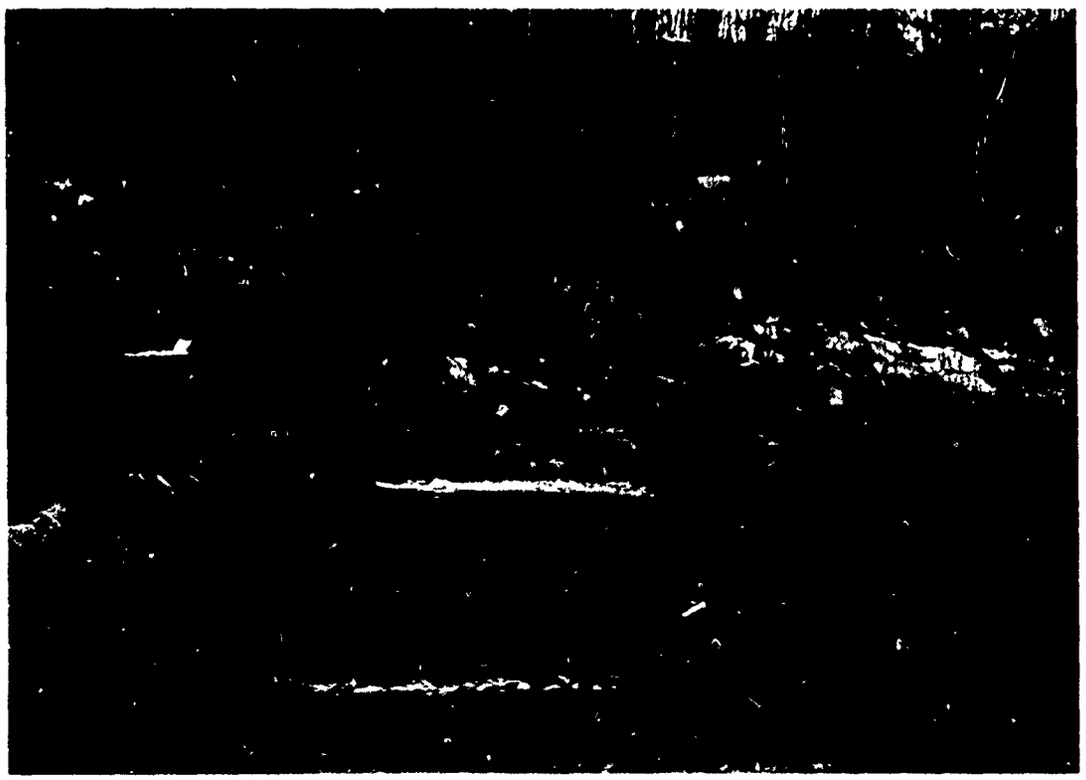
APPENDIX B



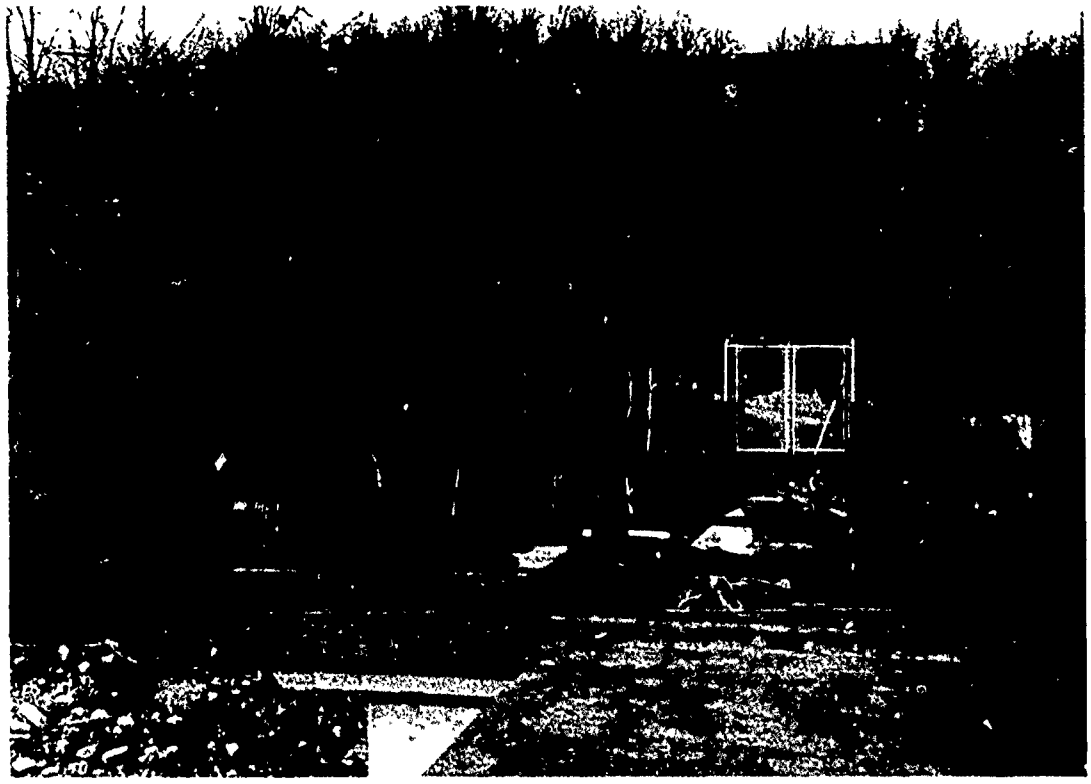
2. DOWNSTREAM FACE OF SPILLWAY AND RIGHT NON-OVERFLOW MONOLITH

3. DOWNSTREAM FACE OF SPILLWAY AND LEFT NON-OVERFLOW MONOLITH

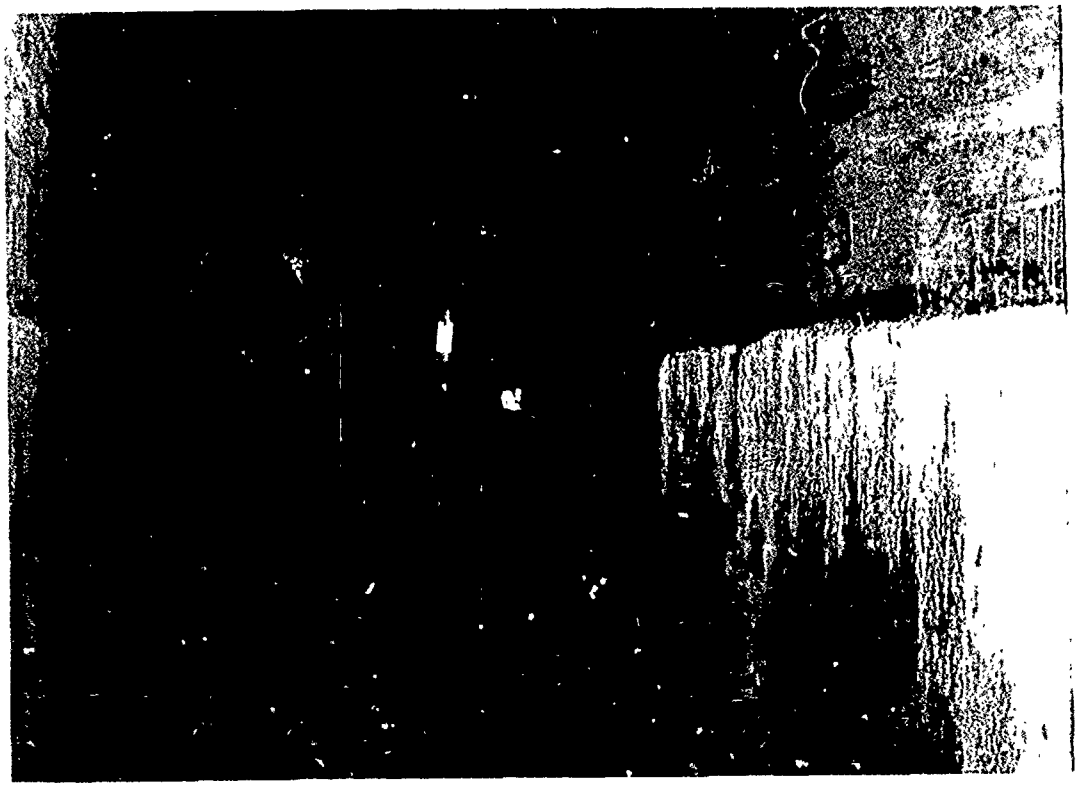
4. UPSTREAM VIEW OF DAM



5. DOWNSTREAM VIEW OF SPILLWAY BUCKET SILL DISCHARGE OF 20 INCH OUTLET AND TWO 12 INCH BUCKET DRAINS, VIEWED FROM RIGHT BANK



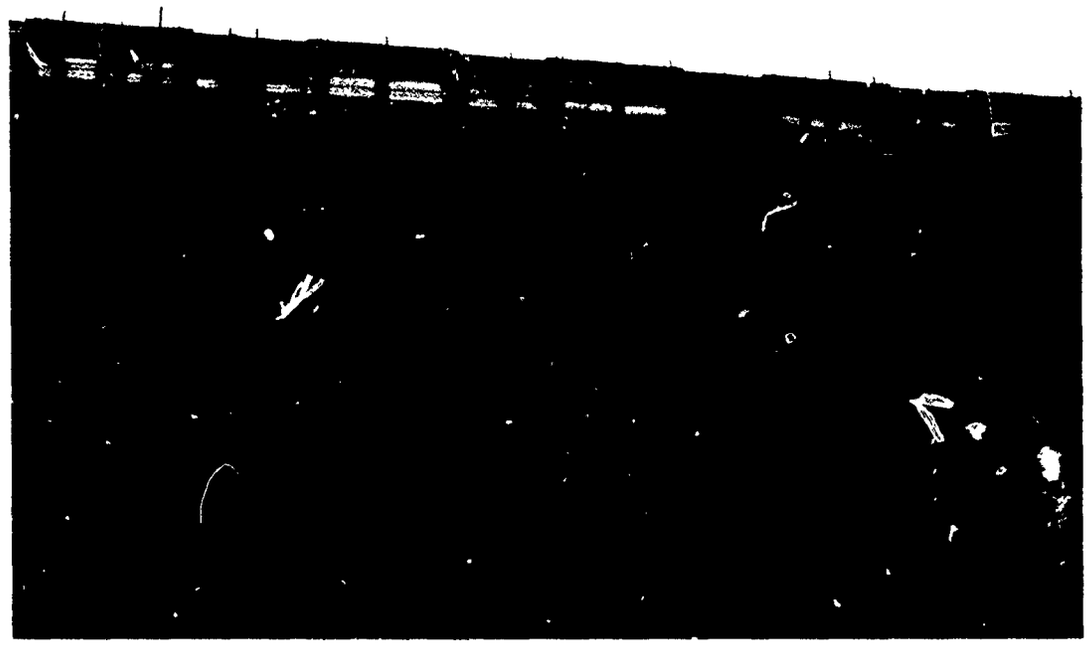
6. INTAKE CHAMBER SHOWING "A" TYPE HOIST FRAME AND TWO FLOOR STANDS OF SLUICE GATES



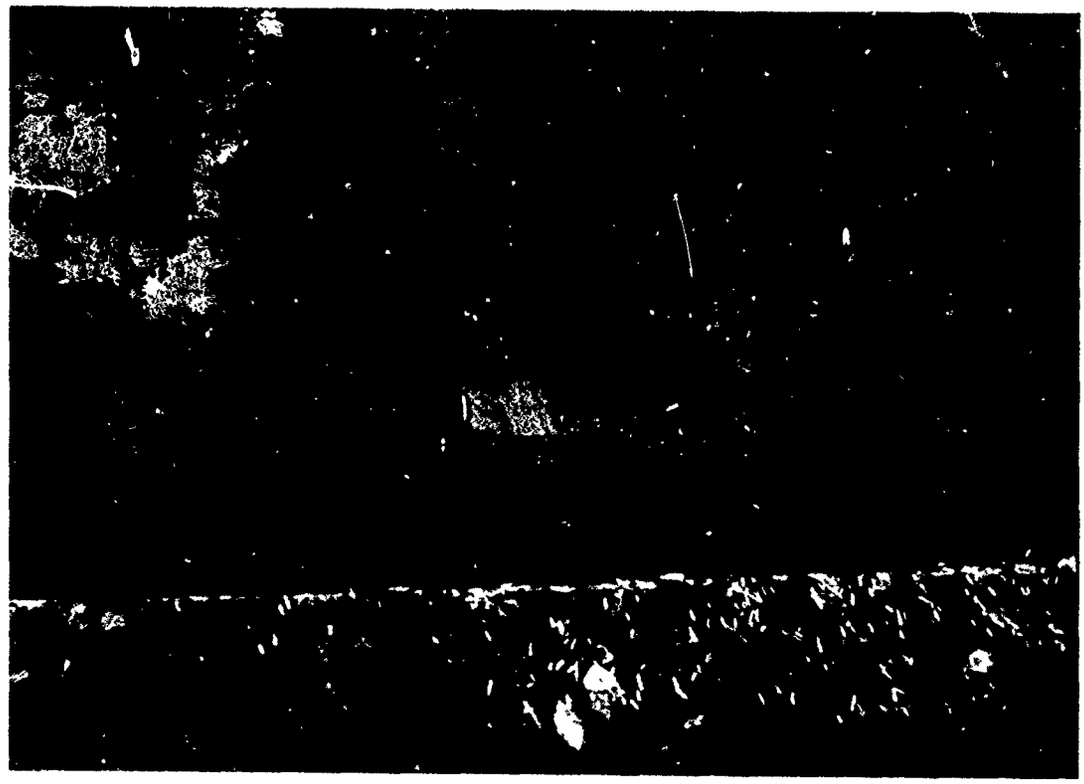
7. INTERIOR OF GALLERY, SHOWING 36 INCH VALVE AND WHITE MINERAL DEPOSITION ALONG D/S SIDE OF WALL

8. DOWNSTREAM CHANNEL WITH RIPRAP AT RIGHT BANK

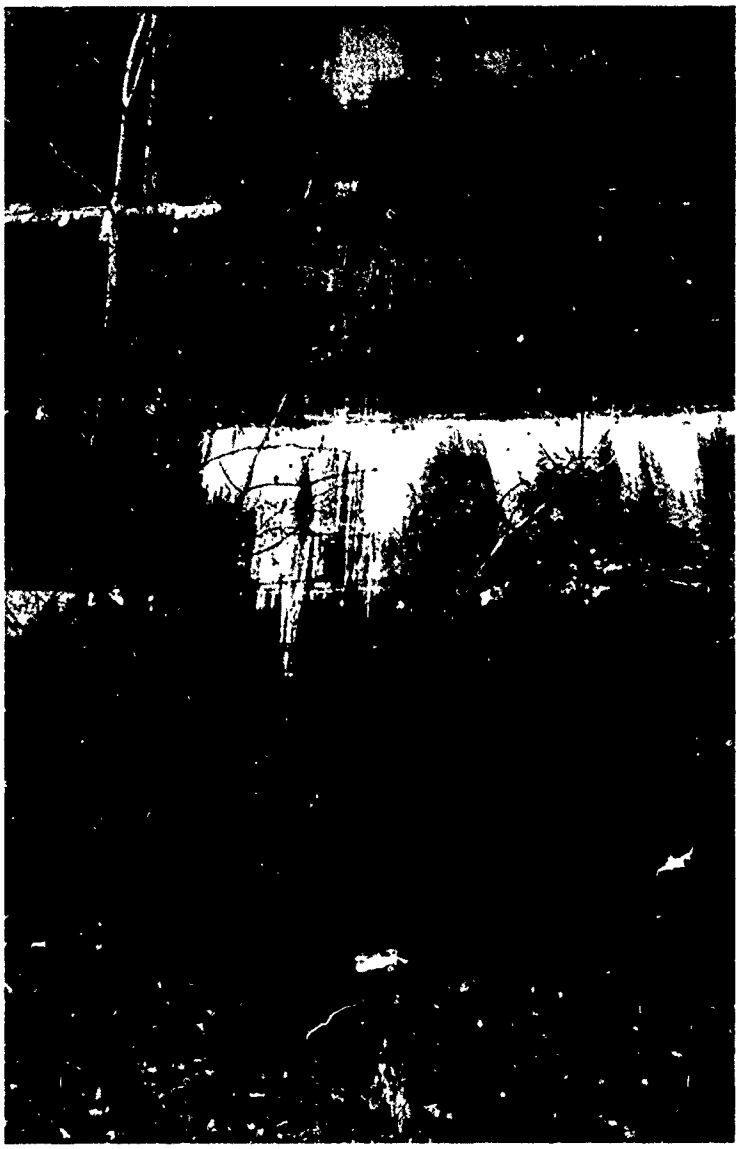
9. OVERALL VIEW OF DOWNSTREAM CHANNEL



10. DETERIORATING CONCRETE SURFACE AND SPALLING ALONG JOINTS



11. WIDENED GAP AT HORIZONTAL JOINT AND WET MARK



12. GALLERY ENTRANCE GATE AT RIGHT NON-OVERFLOW MONOLITH SHOWING WHITE MINERAL DEPOSITION

ENGINEERING DATA CHECKLIST

APPENDIX C

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM STILWELL LAKE

ID # 770

ITEM	REMARKS
AS-BUILT DRAWINGS	see Appendix for list of drawings available.
REGIONAL VICINITY MAP	U.S.G.S
CONSTRUCTION HISTORY	Construction procedures and diversion schemes were discussed in design Report.
TYPICAL SECTIONS OF DAM	Concrete gravity section see drawings NOS. 7512-468, 7512-469.1
OUTLETS-PLAN	see Dwg. 75-12-455.1
-DETAILS	20 inch dia. C.I. pipe controled by two sluice gates, 36 inch dia. blow-off controled by valve in the gallery
-CONSTRAINTS	None. there is a 20 inch dia. intake pipe at Queensboro Furnace for water supply to Lusk Reservoir.
-DISCHARGE RATINGS	available, see Dwg. 7512-464
RAINFALL/RESERVOIR RECORDS	Available at Water Plant.

ITEM	REMARKS
DESIGN REPORTS	Available from Alexander Potter Associates, New York City
GEOLOGY REPORTS	Same as above
DESIGN COMPUTATIONS	Same as above
HYDROLOGY & HYDRAULICS	
DAM STABILITY	
SEEPAGE STUDIES	None available
MATERIALS INVESTIGATIONS	See Design Reports above
BORING RECORDS	
LABORATORY	
FIELD	
POST-CONSTRUCTION SURVEYS OF DAM	None available
BORROW SOURCES	unknown

ITEM	REMARKS
MONITORING SYSTEMS	Level indicator installed at office of Water Plant.
MODIFICATIONS	None except that 36 inch diameter valve in gallery was replaced in 1974.
HIGH POOL RECORDS	Dam has not been overtopped. Reservoir elevations are recorded by leve indicator.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None
MAINTENANCE	previous inspection was made in April, 1976.
OPERATION RECORDS	upper sluice gate is usually open, reservoir level is normally maintained near spillway crest. Records of gate and valve opening is maintained. No operation and maintenance Manual

ITEM	REMARKS
SPILLWAY PLAN	
SECTIONS	Concrete ogee weir section
DETAILS	See drawing NO. 7512-467
OPERATING EQUIPMENT	Gates and valve are hand operated.
PLANS & DETAILS	none

VISUAL INSPECTION CHECKLIST

APPENDIX D

VISUAL INSPECTION CHECKLIST

1. Basic Data

a. General

Name of Dam Stilwell Lake Dam Hazard Category Significant

County Orange ID# 770

Stream Name Popolopen Creek Tributary of Hudson River

Location Orange County Nearest Town (P.O.) Fort Montgomery

Longitude 74°-01'-57" Latitude 41-20'-39" Other Directions

about 5 miles S.W. of West Point, 600 ft. S.E. of Rt. 293 and Mine Torne Rd.

Date of Insp Dec. 5, 1978 Weather Sunny - Cloudy Temperature 45°F

b. Inspection Personnel T.C. Chiang - Structural Engineer

M.A. Marino - Geotechnical Engineer

c. Persons Contacted

John O'Connor, Kenneth J. Tomann R. Hunjan of Civil Engineer of U.S.M.A.

Jim McDonald, water plant forman USMA

d. History: Date Constructed Nov. 1948

Present Owner U.S.M.A

Designed by Alexander Potter Associates, new York C

Constructed by U.S. Army Corps of Engineer

Recent History

2. Technical Data

Type of Dam Concrete Gravity Drainage Area 8021 Acres

Height 52 ft Length 650 ft

Upstream Slope vert. Downstream Slope 10 (1) on 8 (1)

Top Crest Width 9'-8" Bottom Freeboard at Spillway Crest 15.8 ft

Low Level Control: (Type and Size) 36" C.I. Pipe

Valve Condition Good condition, replaced in 1974

~~Emergency~~ Spillway Type (Material) Concrete Ogee Weir Width 160 feet

Side Slopes (See drwgs)

Height (Crest to Top) of Dam 15.8 feet

Exit Slope (See drwgs)

Exit Length (See drwgs)

Ponded Surface Area _____ Acres

Capacity (Normal Level) 1924 Acre Feet

Capacity ~~Emergency~~ Spillway Level 1924 Acre Feet

3. Embankment

Not applicable – Concrete Gravity Dam

a. Crest

(1) Vertical Alignment

(2) Horizontal Alignment

(3) Longitudinal Surface Cracks

(4) Transverse Surface Cracks

(5) General Condition of Surface

(6) Miscellaneous

b. Upstream Slope Not applicable

(1) Undesirable Growth or Debris

(2) Sloughing, Subsidence, or Depressions

(3) Slope Protection

(a) Condition of Riprap

(b) Durability of Individual Stones

(c) Adequacy of Slope Protection Against Waves and Runoff

(d) Gradation of Slope Protection - Localized Areas of Fine Materia

(4) Surface Cracks

c. Downstream Slope

(1) Undesirable Growth or Debris

(2) Sloughing, Subsidence, or Depressions; Abnormal Bulges or Non-Uniformity

Not applicable

(3) Surface Cracks on Face of Slope

(4) Surface Cracks or Evidence of Heaving at Embankment Toe

(5) Wet of Saturated Areas or Other Evidence of Seepage on Face of Slope; Evidence of "Piping" or "Boils"

(6) Fill Contact with Outlet Structure

(7) Condition of Grass Slope Protection

d. Abutments

(1) Erosion of Contact of Embankment with Abutment from Surface Wate... Runoff, Upstream or Downstream

(2) Springs or Indications of Seepage Along Contact of Embankment with the Abutments

(3) Springs or Indications of Seepage in Areas a Short Distance Downstream of Embankment -- Abutment Tie-in

Not applicable

c. Area Downstream of Embankment, Including Tailrace Channel

(1) Localized Subsidence, Depressions, Sinkholes, Etc.

(2) Evidence of "Piping" or "Boils"

(3) Unusual Presence of Lush Growth, such as Swamp Grass, etc.

(4) Unusual Muddy Water in Downstream Channel

(5) Sloughing or Erosion

(6) Surface Cracks or Evidence of Heaving Beyond Embankment, Toe

(7) Stability of Tailrace Channel Sideslopes

(8) Condition of Tailrace Channel Riprap

(9) Adequacy of Slope Protection Against Waves, Currents and Surface Runoff

(10) Miscellaneous

f. Drainage System

(1) Condition of Relief Wells, Drains and Appurtenances

(2) Unusual Increase or Decrease in Discharge from Relief Wells

4. Instrumentation

None

(1) Monumentation/Surveys

(2) Observation Wells None

(3) Weirs None

(4) Piezometers None

(Other)

5. Reservoir

water elevation at El. 599 or 3 ft below spillway crest at time of inspection.

a. Slopes Portions of reservoir slopes visible from the dam show no signs of distress, instability or other adverse conditions

Both banks immediate u/s of dam are well protected by riprap.

b. Sedimentation Not visible

6. Spillways

Ungated spillway with 5 ft flashboard, 4 monoliths width 160 ft.

a. Principal Spillway: Inlet Condition

Pipe Condition

General Remarks (include information such as recently repaire potential for debris accumulation, special items of note, etc.)

Crest at el. 602, Some minor deterioration of concrete near crest existed. No repair has been made. Spillway is in good condition. Flashboards at first left monolith were in horizontal position, all others were in upright positin

~~b. Emergency Spillway: General Condition~~ Owner is contemplating to replace flash boards and also to provide access from top of non-overflow monolith (El. 617.8) to spillway crest.

Tree Growth Some debris and bushes existed in the downstream of channel.

Erosion No erosion observed

Other Observations 36"ϕ Blow-off is closed. Two 12"ϕ C.I. drains for Bucket are working properly water @ d/s of Spillway is retained to top of s

7. Structural (if required) See Attached Appendix

8. Downstream Channel

Immediate right bank has good riprap protection while the left bank has rock outcrop.

a. Condition (obstructions, debris, etc.) There is no concrete apron beyond the dam. The stream bed is full of rocks and stones. Some debris existed but constitute no obstruction. There are a line of trees along o/s face of right non-overflow monoliths.

b. Slopes appeared to be stable.

c. Approximate No. Homes and Population

Few houses within 2 miles could be affected by a flood.

d. General

Nair Nair
TEAM CAPTAIN

STRUCTURAL INSPECTION CHECKLIST

PHASE I DAM INSPECTION

1. Concrete Surfaces Minor deterioration at D/S face near spillway crest. Some spalling along horizontal joints of Spillway. Some white mineral deposit along horizontal joint above Gallery entrance gate at right non-overflow Monolith. Overall condition is good.

2. Structural Cracking None observed.

3. Movement - Horizontal and Vertical Alignment None observed.

4. Junctions with Abutments or Embankments good condition

5. Drains - Foundation, Joint, Face foundation drains not visible. Two 12"ϕ Bucket drains and 20"ϕ C.I outlet from intake chamber are in good working conditions.
6"ϕ drains in gutter of Gallery are clogged by silt, 1" deep water in gallery

6. Water Passages, Conduits, Sluices No overflow from spillway. 36"ϕ Blow-off is closed. Two 20"ϕ Sluice gates in Intake Chamber. Lower one is closed, ~~while the upper one is open. water flows out from~~ 20"ϕ C.I. Pipe.

7. Seepage or Leakage No seepage or leakage observed. there are white mineral deposit along D/S face wall of Gallery.

8. Monolith Joints - Construction Joints In general, good condition. Some spalling along horizontal joints of Spillway.

9. Foundation D/S face of dam covered by dirt and leaves. Left bank has rock outcrop. Dam foundation found to be typical granite gneiss.

10. Abutments No defect or damage observed.

11. Control Gates Two 20"ϕ sluice gates at two levels are located at Intake Chamber to permit withdrawal of water through 20"ϕ C.I Pipe. Gates are in operating condition.

12. Approach and Outlet Channels well protected by riprap.

13. Stilling Basin Not applicable

14. Intake Structure located at left non-overflow monolith to house two 20"ϕ sluice Gates "A" type steel hoist frame and other maintenance features are in good condition

15. Settlement None.

16. Stability

a. Overturning There is no adverse effect to the stability.

b. Sliding Shear-friction resistance should be investigated

c. Seismic Not significant - Seismic Zone No. 2

17. Instrumentation

a. Alignment None

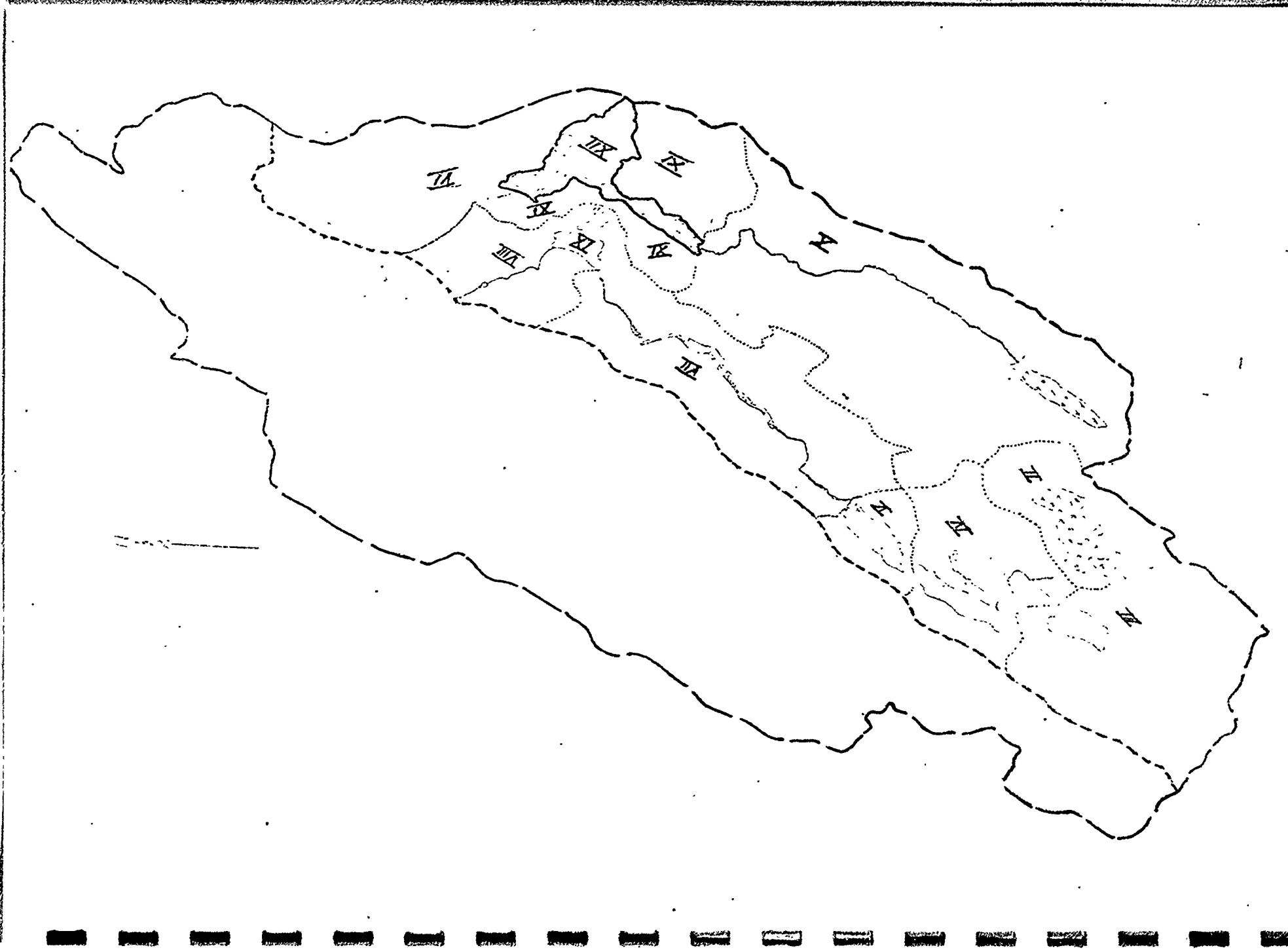
b. Uplift

c. Seismic

18. Miscellaneous

HYDROLOGIC DATA AND COMPUTATIONS

APPENDIX E


IA
IIA
IIIA
IVA
VA
VIA
VIIA
VIIIA
IXA

TAMS

Job No. 1487-16 Sheet 1 of ____

Project STILLWELL LAKE Date 11/2/78

Subject UPSTREAM STORAGE OF PMF IN MINE LAKE WATERSHED By CV

Ch'k. by ____

SUB AREA	TOTAL SURFACE AREA (ACRES)	LAND USE (%)	LOSS* (IN)	PMP RO (IN)	PONDING AREA (IN)	3-FT PONDING STORAGE (AC FT)	3-FT PONDING STORAGE (IN · RO)
II	244.1	79.3	0.95	18.57	50.5	151.5	7.45
III	580.7	96.0	1.15	18.37	23.2	69.6	1.44
IV	97.7	67.2	0.81	18.71	37.0	96.0	11.79
IVa	219.5	88.2	1.06	18.46	25.9	77.7	4.25
V	101.0	71.6	0.86	18.66	28.7	86.1	10.23
	Σ 1243.0				Σ 160.3	480.9	

TOTAL PONDING AREA 160.3. ASSUMING 3 FEET AVERAGE PONDING DEPTH, AVAILABLE STORAGE IN 1243 ACRES IS 480.9 ACRE-FEET OR $\frac{480.9}{1243} \times 12 = 4.64$" RO

SUB AREA	PERCENT: PONDED TO TOTAL RUNOFF	APPRX. TIME SPLGE BEGINS (HRS)	ADOPTED EVEN-TIME BEGIN. HOUR
II	7.45 : 18.57 = .4012	2.47	2:50
III	1.44 : 18.37 = .0784	1.05	1.00
IV	11.79 : 18.71 = .6301	3.12	3.25
IVa	4.25 : 18.46 = .2302	2.02	2:00
V	10.23 : 18.66 = .5482	2.85	2.75

6-HR PMP = 24.4". EFFECTIVE PMP : 0.8 (24.4) = 19.52"

@ EQUIVALENT FLOW TO BE SUBTRACTED FROM BEGINNING OF EACH HYDROGRAPH

* LOSS = 0.2 × 6 hr × %

TAMS

Job No. 1487-18 Sheet 1 of ____

Project STILWELL LAKE Date 1/2/78

Subject PMF FROM "PONDING" AREAS ABOVE MINE LAKE BEFORE LAG By CV

Ch'k. by ____

	Δ%	II	III	IV	IVa	V
1.						
1.25	.029	530.2	1247.7	213.8	473.9	220.4
1.50	.029	530.2	1247.7	213.8	473.9	220.4
1.75	.041	749.6	1764.0	302.3	670.1	311.7
2.	.060	1097.0	2581.5	442.4	980.6	456.1
2.25	.077	1407.8	3313.0	567.7	1258.4	585.3
2.50	.107	1956.3	4603.7	788.9	1758.3	813.4
2.75	.101	1846.6	4345.6	744.6	1650.6	767.8
3.	.085	1554.0	3657.2	626.7	1389.1	646.1
3.25	.070	1279.8	3011.8	516.1	1144.0	532.1
3.5	.058	1060.4	2495.5	427.6	947.9	440.9
3.75	.045	822.7	1936.1	331.8	735.4	342.1
4	.037	676.5	1591.9	272.8	604.7	281.2
4.25	.033	603.3	1419.8	243.3	539.3	250.8
4.50	.027	493.6	1161.7	196.4	441.3	205.2
4.75	.024	438.8	1032.6	176.9	392.2	182.4
5	.022	402.2	946.6	162.2	359.5	167.2
5.25	.022	402.2	946.6	162.2	359.5	167.2
5.50	.022	402.2	946.6	162.2	359.5	167.2
5.75	.022	402.2	946.6	162.2	359.5	167.2
6.	.018	329.1	774.5	132.7	294.2	136.8

II $\frac{18.57 \times 244.1 \times 43560}{12 \times 15 \times 60} = 18.57 \times 244.1 \times 4.033 = 18\,282.8$

III $18.37 \times 580.7 \times 4.033 = 43025.4$

IV $18.71 \times 97.7 \times 4.033 = 7372.8$

IVa $18.46 \times 219.5 \times 4.033 = 16342.9$

V $18.66 \times 101.0 \times 4.033 = 7601.5$

TAMS

Job No. 1487-18 Sheet 3 of _____

Project STILWELL LAKE SAFETY INSPECTION Date Nov 30. 78

Subject PMF from Ponding Areas after LAG By DLC

Ch'k. by _____

	II	III	IV	IVa	V	Σ
1						
1.25						
1.50						
1.75						
2.		1247.7				1247.7
2.25		1247.7				1247.7
2.50		1764.0				1764.0
2.75		2581.5		1258.4		3839.5
3.00		3133.0		1758.3		4891.3
3.25	1841.6	4603.7		1650.6		8100.9
3.50	1554.0	4345.6		1389.1	646.1	7934.8
3.75	1279.8	3657.2		1144.0	522.1	6603.1
4.	1060.4	3011.8	427.6	947.9	440.9	5888.6
4.25	822.7	2495.5	331.8	735.4	342.1	4727.5
4.50	676.5	1936.1	272.8	604.7	281.2	3771.3
4.75	603.3	1591.9	243.3	539.5	250.8	3228.6
5.	493.6	1419.8	196.4	441.3	205.2	2756.3
5.25	438.8	1161.7	176.9	392.2	182.4	2352.0
5.50	402.2	1032.6	162.2	359.5	167.2	2123.7
5.75	402.2	946.6	162.2	359.5	167.2	2037.7
6.	402.2	946.6	162.2	359.5	167.2	2037.7
6.25	402.2					
6.50	329.1				Σ	64552.4
6.75						

$$\frac{64522.4 \times 15 \times 60 \times 12}{1171. \times 43560} = 13.67$$

Losses 1.20

Available Storage 19.52 − 14.87 = 4.65" R.O.

USED

IAMS

Job No. 1487-18 Sheet 4 of ____

Project STILWELL LAKE INSPECTION Date DEC 1 1978

Subject Upstream Storage of ½ PMF in Mine Lake Watershed (½ PMP ~ By DLC

Ch'k. by ____

	Total Surface Area (acres)	LAND AREA (%)	50% PMP.	% Ponded to Excess RO.	Est. Outflow Start time
II	244.1	79.3	9.285	7.45/9.285 = 0.802	3.56/4.00
III	580.7	96.0	9.185	1.44/9.185 = 0.157	1.70/1.75
IV	97.7	67.2	9.355	11.79/9.355 = 1.+	NO OUTFLOW
IVa	219.5	88.2	9.23	4.25/9.28 = 0.460	1.62/1.50
V	101.0	71.6	9.33	10.23/9.33 = 1.+	no outflow.
	Σ 1243.0				

Time	Δ %	II	III	IV	IVa	V
				0		
1.50	.029				237.	0
1.75	.041		882.	0	335.	
2.0	.060		1290.7		490.3	
2.25	.077		1656.3		629.2	
2.5	.107		2301.7		874.3	
2.75	.101		2172.6		825.3	
3.	.085		1828.4		694.5	
3.25	.07		1505.8		572.0	
3.5	.058		1247.6		473.9	
3.75	.045		968.0		367.7	
4.	.037	338.2	795.9		302.3	
4.25	.033	301.7	709.9		269.6	
4.5	.027	246.8	580.8		220.6	
4.75	.024	219.4	516.3		196.1	
5.	.022	201.1	473.2		179.8	
5.25	.022	201.1	473.2		179.8	
5.5	.022	201.1	473.2		179.8	
5.75	.022	201.1	473.2		179.8	
6.0	.018	164.5	387.2	0	147.1	0

II $\frac{9.285 \times 244.1 \times 43560}{12 \times 15 \times 60} = 9.285 \times 244.1 \times 4.033 = 9141.$

III $9.185 \times 580.7 \times 4.033 = 21,511$

IV $9.33 \times 219.5 \times 4.033 = 8171$

TAMS

Job No. 1487-18 Sheet 5 of _____

Project Safety Inspection STILWELL LAKE. Date Dec 1 197

Subject 50% PMF from PONDING AREAS AFTER LAKE MINE LAKE By DLC

Ch'k. by _____

	II	III	IV a.	Σ
2.			237.	237
2.25			335.	335
2.5		882.	490.3	1372.3
2.75		1290.7	629.2	1919.9
3.		1656.3	874.3	2530.6
3.25		2301.7	825.3	3127.0
3.5		2172.6	694.5	2867.1
3.75		1828.4	572.0	2400.4
4.		1505.8	473.9	1979.7
4.25		1247.6	367.7	1615.3
4.5	338.2	968.0	302.3	1608.5
4.75	301.7	795.9	269.6	1367.2
5.	246.8	709.9	220.6	1177.3
5.25	219.4	580.8	196.1	996.3
5.5	201.1	516.3	179.8	897.2
5.75	201.1	473.2	179.8	854.1
6.0	201.1	473.2	179.8	854.1

Σ 26139.0

$$\frac{26139.0 \times 15 \times 60 \times 12}{1171. \times 43560} = 5.53$$

Losses 0.6

Utilized Storage 9.76 - 6.13 3.63" RO.

TAMS

Job No. 1487-18 Sheet 6 of _____

Project STILWELL LAKE Date DEC 1 1976

Subject Inflow computations for Mine LAKE By DLE

Ch'k. by _____

For instantaneous conversion of rainfall to runoff

Adjacent land area (VIII) 206.5 acres — 89 %

Mine lake Area 24.5 — 11 %

Σ 231.0 acres

Weighted PMP = $(89 \times 18.32) + (11 \times 19.52)/100$

= 18.45" inches.

U/H. for Brooks Hollow.

L = 1.74 L_{ca} = 0.98 Area = 1.48 square miles

Assume $C_T = 2.$ and $640\,C_p = 400.$

$(L L_{ca})^{0.3} = 1.17$

$t_p = C_T (L L_{ca})^{0.3} = (2.0)(1.17)$

= 2.34 hrs.

$t_r = t_p/5.5 = 0.425 \approx 25.5$ mins. Use t_R = 15 mins = 0.25 hrs

$T_{p_R} = 2.34 + 0.25(.25 - .425)$

= 2.30 hrs use 2.25 hrs

$q_p = 400/2.25 = 177.8$ cfs

$Q_p = 177.8 \times 1.48 =$ 264 cfs.

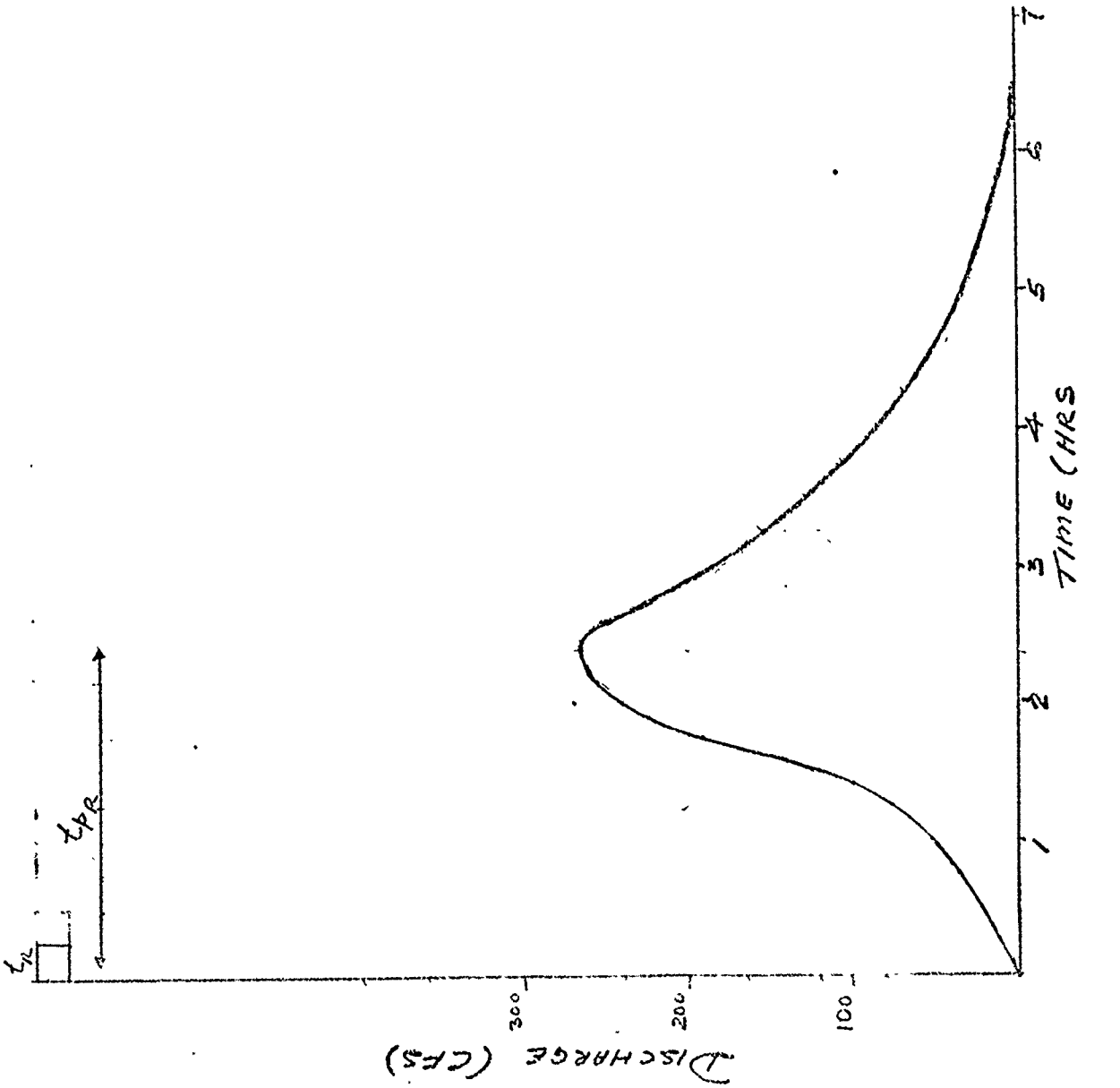
TAMS

Job No. 1487-15
Project Safety Inspection Stillwell Lake
Subject U/H for Brooks Hollow (inflow to Mine Lk. 3)

Sheet 1 of ____
Date Dec 17
By DLC
Ch'k. by ____

U/H Ordinates

Time (HRS)	Q (CFS)
0	0
.5	21
1	52
1.5	120
2	240
2.5	222
3	195
3.5	130
4	84
4.5	52
5	32
5.5	18
6	6
6.5	0



TAMS

Job No. 1487-18 Sheet 8 of ____

Project INSPECTION - STILLWELL LAKE Date DEC 8, 78

Subject MINE LK - OUTFLOW & STORAGE (SURCHARGE) By DLC

COMPUTATIONS Ch'k. by ____

Spillway Length 143.0'
Spillway Crest EL. 92.3'
* Top of Dam EL. 94.7'
Crest Width 5.5'
Dam Length 390.0'

Field EL (FT)	Head (Ft) (H_b)	C	$Q = CLH^{3/2}$ (CFS) Q_b	Q_s	ΣQ	EL (MSL)	Area (acres)
92.3	0					648.63	46.4
93.	0.7	2.68		224	224	649.33	49.6
94.	1.7	2.65		840	840	650.33	54.2
* 94.7	2.4	2.67		1420	1420	651.03	57.4
95.0	2.7 (.3)	2.67	125	1694	1819	651.33	58.8
96.0	3.7 (1.3)	2.69	1131	2738	3869	652.33	63.4
98.0	5.7 (3.3)	2.88	4574	5605	10179	654.33	72.6
100.0	7.7 (5.3)	3.07	9310	9380	18690	656.33	81.9

EL USGS.	EL Field	Area	Mean Area	Δ Volume	Surcharge Storage (Ac Ft)
648.63	92.3	46.4			0
			48.0	33.6	
649.33	93.0	49.6			33.6
			51.9	51.9	
650.33	94.0	54.2			85.5
			55.8	39.1	
651.03	94.7	57.4			124.6
			58.1	17.4	
651.33	95.0	58.8			142.
			61.1	61.1	
652.33	96.0	63.4			203.1
			68.0	136.0	
654.33	98.0	72.6			339.1
			77.25	154.5	
656.33	100.0	81.9			493.6
			90.45	332.95	
660.	103.67	99.			826.6

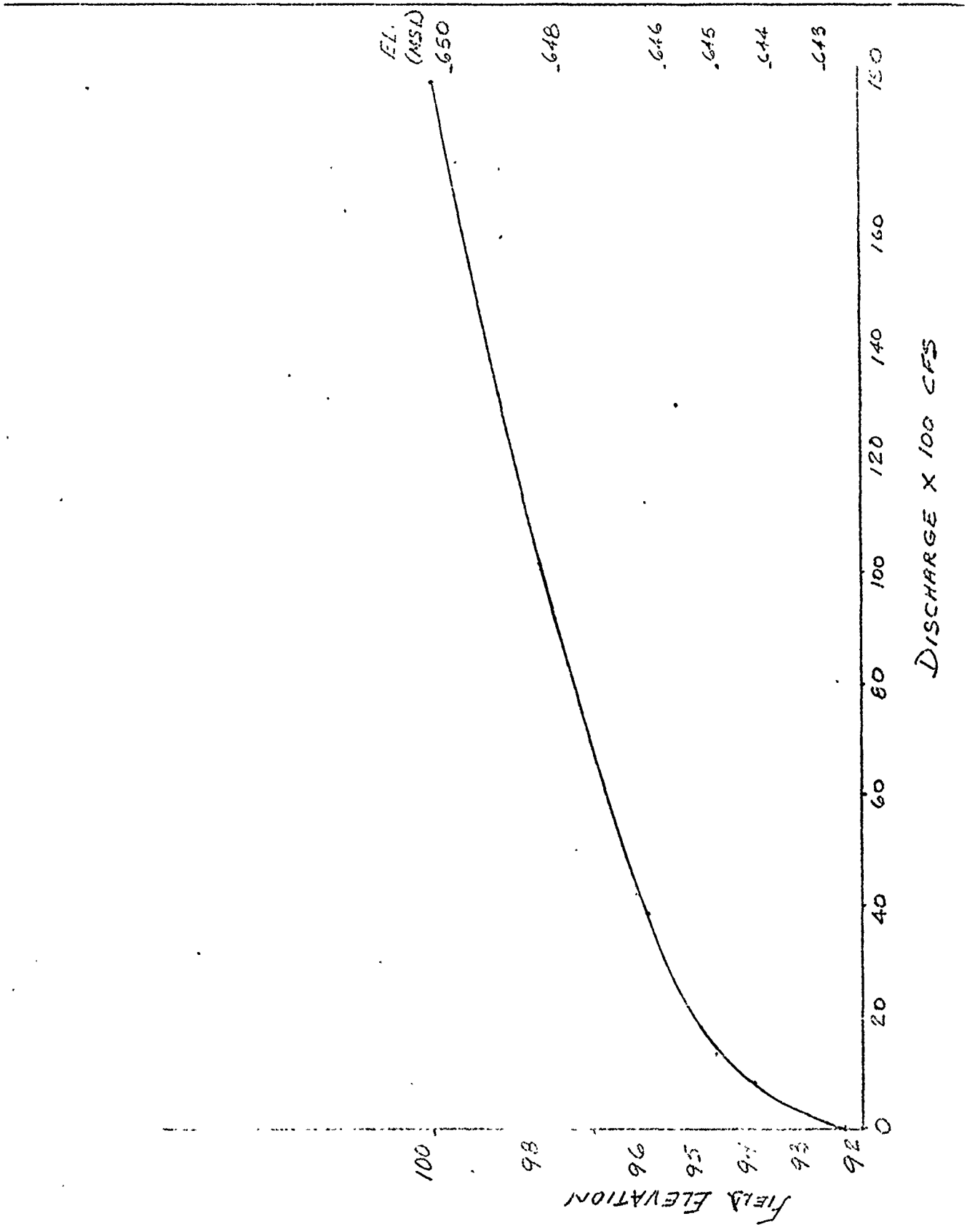
TAMS

Job No. 1487-18 Sheet 8a of _____

Project INSPECTION: STILWELL LAKE Date DEC 8 78

Subject MINES LAKE Spillway rating curve By D.LC

Ch'k. by _____



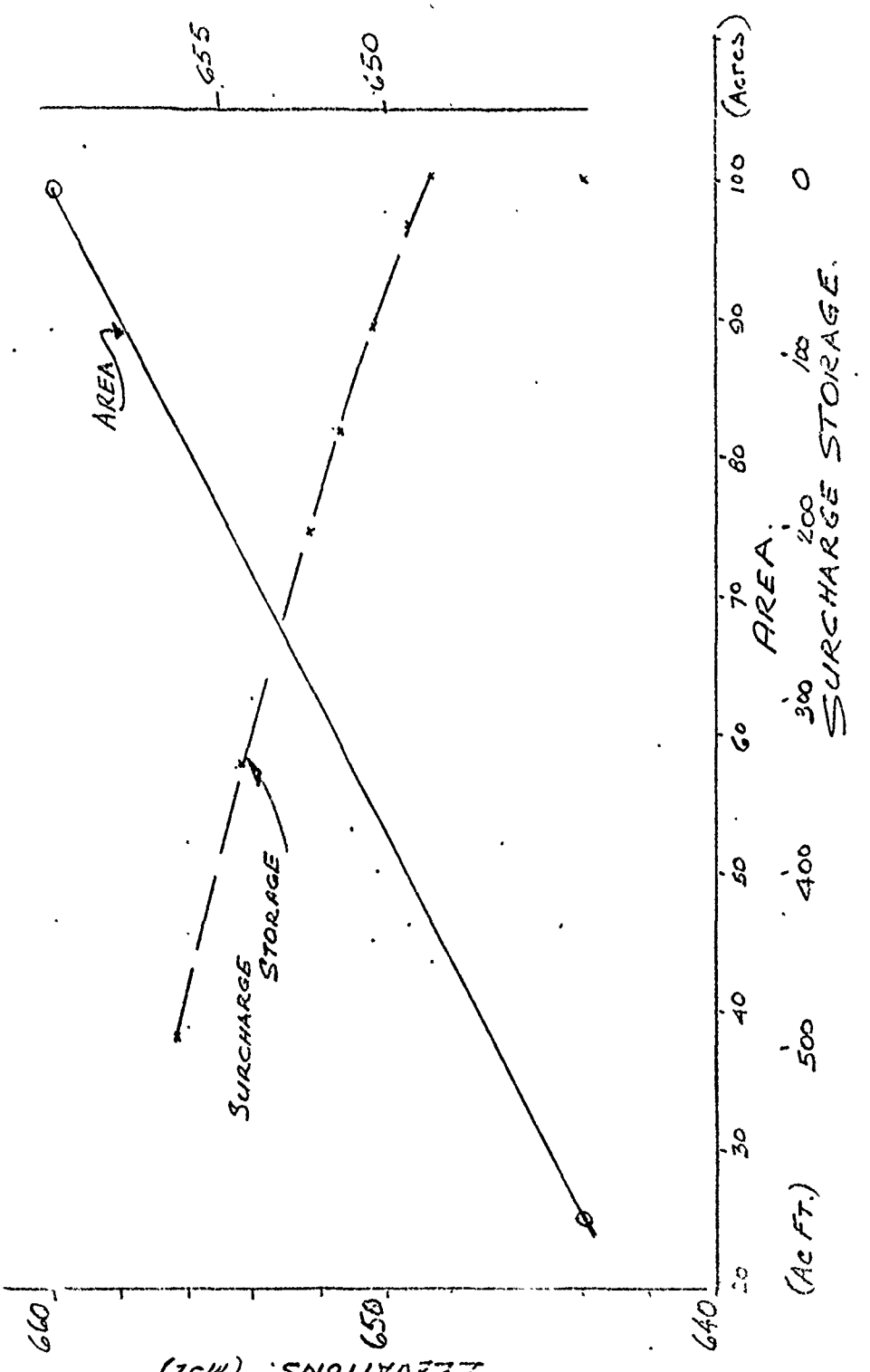
TAMS

Job No. 1487-18 Sheet 9 of _____

Project INSPECTION STILWELL LAKE Date DEC 8, 78

Subject AREA/SURCHARGE STORAGE CURVES. for MINE LAKE. By D.L.C.

Ch'k. by _____



○ Area planimetered from USGS Popolopen Lake Quadrangle.

PMF — Proposed Lake — 10

TIME (HOURS)	TOTAL RUN-OFF COMPUTED (CFS)	PMF Diversion OUTFLOW (CFS)	Ponding Areas Outflow (CFS)	MINE LAKE INFLOW (CFS)
0.000	0.0			0.0
0.250	276.5	0.31		276.8
0.500	311.8	1.09		312.9
0.750	340.0	2.18		342.2
0.999	363.2	3.69		366.9
1.249	565.6	5.93		571.5
1.499	608.2	9.07		617.3
1.749	872.9	13.37		886.3
1.999	1312.8	19.40	1247.1	2579.9
2.249	1750.2	30.07	1247.7	3028.0
2.499	2345.3	1303.44	1764.	5412.7
2.749	2421.7	4084.09	3839.5	10345.3
2.999	2396.9	6647.93	4891.3	13936.1
3.249	2340.9	9040.19	8100.9	19482.0
3.499	2406.0	11323.19	7954.8	21684.0
3.749	2482.8	12899.45	6603.1	21985.4
3.999	2661.9	13543.07	5883.6	22092.6
4.249	2859.5	13679.64	4727.5	21266.6
4.499	3026.9	13542.22	3771.3	20340.4
4.749	3120.8	13263.79	3228.6	19613.2
4.999	3118.4	12892.99	2756.3	18767.7
5.249	3049.9	12451.29	2352.0	17853.2
5.499	2929.6	11980.67	2123.7	17034.0
5.749	2736.4	11510.11	2037.7	16284.2
5.999	2556.8	11044.64	2037.7	15639.1
6.249	2025.4	10490.57		12,516.0
6.499	1841.7	9761.08		11602.8
6.749	1665.7	8882.48		10548.2
6.999	1502.4	7875.73		9378.1
7.249	1344.0	6914.96		8259.0
7.499	1189.9	6048.80		7238.7
7.749	1029.5	5233.22		6262.7
7.999	860.9	4462.18		5323.1
8.249	701.7	3753.51		4455.2
8.499	552.2	3121.87		3674.1
8.749	428.6	2572.38		3001.0
8.999	330.5	2102.37		2432.9
9.249	251.4	1704.73		1956.1
9.499	189.4	1370.29		1559.7
9.749	140.6	1138.88		1279.5
9.999	103.8	998.47		1102.3
10.249	75.0	858.13		933.1
10.499	53.6	723.41		777.0
10.749	36.8	598.15		635.0
10.999	24.2	485.03		509.2
11.249	14.6			14.6
11.499	7.8			7.8
11.749	3.2			3.2

SAFETY INSPECTION STILLWELL LAKE
RESEVOIR ROUTING MINES LAKE
TAMS JOB NO. 1478-18 DEC 1978

PMF

INPUT PARAMETERS

STARTING ELEV (FT.)	TIME INTERVAL (HOURS)	STARTING TIME (HOURS)	ENDING TIME (HOURS)	PRINT INTERVAL	GATE OPTION	PLOT OPTION	STORAGE COEF.	OUTFLOW COEF.	INFLOW COEF.	TIME COEF.	BREAK TIME
48.63	0.25	0.00	11.75	1	NO	NO	1.000	1.000	1.000	1.000	0.000

RESERVOIR ELEV. (FT.)	RESERVOIR STORAGE (ACFT)	RESERVOIR OUTFLOW (CFS)
48.63	0.0000	0.00
49.33	33.6000	224.00
50.33	85.5000	840.00
51.03	124.6000	1420.00
51.33	142.0000	1694.00
52.33	203.1000	2738.00
54.33	339.1000	5605.00
56.33	493.6000	9380.00

TIME (HRS)	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (ACFT)	ELEVATION (FT.)
0.00	0.00		0.0000	48.63
0.25	276.80	17.80	2.6712	48.68
0.50	312.90	53.45	8.0185	48.79
0.75	342.20	88.72	13.3088	48.90
1.00	366.90	122.93	18.4396	49.01
1.25	571.50	167.48	25.1230	49.15
1.50	617.30	222.42	33.3630	49.32
1.75	886.30	336.53	43.0817	49.51
2.00	2579.89	640.24	68.6697	50.00
2.25	3028.00	1172.75	107.9319	50.73
2.50	5412.70	2032.52	161.8119	51.65
2.75	10345.30	3981.82	262.1024	53.19
3.00	13936.10	7040.37	397.8460	55.09
3.25	19482.00	10870.50	554.6024	57.11
3.50	21664.00	14714.03	711.9071	59.15
3.75	21985.40	17530.84	827.1909	60.64
4.00	22092.60	19316.69	900.2807	61.59
4.25	21266.60	20252.73	938.5900	62.09
4.50	20340.40	20470.91	947.5195	62.20
4.75	19613.20	20275.17	939.5085	62.10
5.00	18767.70	19845.47	921.9221	61.87
5.25	17853.20	19237.39	897.0350	61.55
5.50	17034.00	18526.80	867.9526	61.17
5.75	16284.20	17786.93	837.6718	60.78
6.00	15639.10	17063.86	808.0788	60.40
6.25	12516.00	15680.87	759.6622	59.77
6.50	11602.86	14367.03	697.7053	58.97
6.75	10548.20	13063.13	644.3402	58.28
7.00	9378.10	11835.10	594.0806	57.63
7.25	8259.00	10640.13	545.1737	56.99
7.50	7238.70	9494.78	498.2977	56.39
7.75	6262.70	8407.74	453.8084	55.81
8.00	5323.10	7371.90	411.4144	55.26
8.25	4455.20	6388.38	371.1619	54.74
8.50	3674.10	5485.00	333.4080	54.24
8.75	3001.00	4727.01	297.4515	53.71
9.00	2432.90	4017.51	263.7955	53.22
9.25	1956.10	3374.03	233.2713	52.77
9.50	1559.70	2803.58	206.2111	52.37
9.75	1279.50	2382.74	182.3086	51.98
10.00	1102.30	2028.28	161.5641	51.65
10.25	933.10	1727.73	143.9744	51.36
10.50	777.00	1483.37	128.6247	51.09
10.75	635.00	1275.34	114.8484	50.85
11.00	509.20	1089.72	102.3350	50.63
11.25	14.60	871.22	87.6049	50.36
11.50	7.80	679.11	71.9449	50.06
11.75	3.20	532.62	59.6028	49.83
MAX. VALUES	22092.60	20470.91		62.20
MIN. VALVES	0.00	0.00		48.63

SPF

SPF

TIME (HOURS)	TOTAL RUN-OFF COMPUTED (CFS)	Popolopen Lake OUTFLOW (CFS)	(C
0.000	0.0		0.0
0.250	138.2	0.15	138.4
0.500	155.9	0.54	156.4
0.750	170.0	1.09	171.1
0.999	181.6	1.84	183.4
1.249	282.8	2.96	285.8
1.499	304.1	4.53	308.6
1.749	436.4	6.68	443.1
1.999	656.4	9.70	666.1
2.249	875.1	13.79	888.9
2.499	1172.6	19.22	1191.8
2.749	1210.8	28.23	1239.0
2.999	1196.4	796.51	1994.9
3.249	1170.4	2311.30	3481.7
3.499	1203.0	3642.76	4845.8
3.749	1241.4	4571.38	5812.8
3.999	1330.9	5214.70	6545.6
4.249	1429.7	5738.38	7168.1
4.499	1513.4	6075.69	7589.1
4.749	1560.4	6197.01	7757.4
4.999	1559.2	6196.33	7755.5
5.249	1524.9	6110.94	7635.8
5.499	1464.8	5958.77	7423.6
5.749	1368.2	5773.10	7141.3
5.999	1278.4	5558.26	6836.7
6.249	1012.7	5234.45	6247.2
6.499	920.8	4774.10	5694.9
6.749	832.8	4267.79	5100.6
6.999	751.2	3794.07	4545.3
7.249	672.0	3371.64	4043.6
7.499	594.9	2973.16	3568.6
7.749	514.7	2586.03	3100.7
7.999	430.4	2212.83	2643.2
8.249	350.3	1865.86	2216.7
8.499	276.1	1554.43	1830.5
8.749	214.3	1282.29	1496.6
8.999	165.2	1115.41	1280.6
9.249	125.7	991.86	1117.6
9.499	94.7	868.99	963.7
9.749	70.5	751.05	821.4
9.999	51.9	640.58	692.5
10.249	37.5	539.07	576.6
10.499	26.8	447.33	474.1
10.749	18.4	365.72	384.1
10.999	12.1	294.38	306.5
11.249	7.3		7.3
11.499	3.9		3.9
11.749	1.6		1.6

SAFETY INSPECTION STILLWELL LAKE
RESEVOIR ROUTING MINES LAKE
TAMS JOB NO. 1478-18 DEC 1978

SPF

INPUT PARAMETERS

STARTING ELEV (FT.)	TIME INTERVAL (HOURS)	STARTING TIME (HOURS)	ENDING TIME (HOURS)	PRINT INTERVAL	GATE OPTION	PLOT OPTION	STORAGE COEF.	OUTFLOW COEF.	INFLOW COEF.	TIME COEF.	BREAK TIME
48.63	0.25	0.00	11.75	1	NO	NO	1.000	1.000	1.000	1.000	0.000

RESERVOIR ELEV. (FT.)	RESERVOIR STORAGE (ACFT)	RESERVOIR OUTFLOW (CFS)
48.63	0.0000	0.00
49.33	33.6000	224.00
50.33	85.5000	840.00
51.03	124.6000	1420.00
51.33	142.0000	1694.00
52.33	203.1000	2738.00
54.33	339.1000	5605.00
56.33	493.6000	9380.00

TIME (HRS)	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (ACFT)	ELEVATION (FT.)
0.00	0.00		0.0000	48.63
0.25	138.40	8.90	1.3356	48.65
0.50	156.40	26.72	4.0087	48.71
0.75	171.10	44.35	6.6535	48.76
1.00	183.40	61.45	9.2185	48.82
1.25	285.80	83.73	12.5604	48.89
1.50	308.60	111.20	16.6805	48.97
1.75	443.10	145.25	21.7885	49.08
2.00	666.10	197.92	29.6894	49.24
2.25	888.90	307.39	40.6264	49.46
2.50	1191.80	466.78	54.0557	49.72
2.75	1239.00	629.58	67.7719	49.98
3.00	1994.90	845.30	85.8577	50.33
3.25	3481.70	1344.95	119.5410	50.93
3.50	4845.80	2157.45	169.1239	51.77
3.75	5812.80	3179.18	224.0281	52.63
4.00	6545.60	4236.10	274.2596	53.37
4.25	7168.10	5162.45	318.1071	54.02
4.50	7589.10	5993.02	354.9808	54.53
4.75	7757.40	6658.62	382.2219	54.88
5.00	7755.50	7093.51	400.0207	55.11
5.25	7635.80	7332.04	409.7830	55.24
5.50	7423.60	7410.34	412.9875	55.28
5.75	7141.30	7359.67	410.9140	55.25
6.00	6936.70	7232.64	405.7149	55.19
6.25	6247.20	6978.83	395.3273	55.05
6.50	5694.90	6579.61	378.9882	54.84
6.75	5100.60	6111.43	359.8268	54.59
7.00	4545.30	5601.34	338.9268	54.32
7.25	4043.60	5140.04	317.0444	54.00
7.50	3568.60	4669.20	294.7091	53.67
7.75	3100.70	4198.13	272.3637	53.34
8.00	2643.20	3730.03	250.1582	53.02
8.25	2216.70	3271.13	228.3900	52.70
8.50	1830.50	2830.79	207.5016	52.39
8.75	1496.60	2470.57	187.4490	52.07
9.00	1280.60	2148.79	168.6167	51.76
9.25	1117.60	1866.35	152.0869	51.49
9.50	963.70	1626.20	137.6945	51.25
9.75	821.40	1422.46	124.7566	51.03
10.00	692.50	1246.69	112.9168	50.82
10.25	576.60	1085.12	102.0245	50.62
10.50	474.10	937.37	92.0641	50.44
10.75	384.10	810.25	82.9938	50.28
11.00	306.50	709.14	74.4748	50.11
11.25	4.57	588.75	64.3316	49.92
11.50	3.90	461.64	53.6220	49.71
11.75	1.60	361.84	45.2141	49.55
MAX. VALUES	7757.40	7410.34		55.28
MIN. VALVES	0.00	0.00		48.63

TAMS

Job No. 1467-13 Sheet 16 of _____

Project INSPECTION STILLWELL LAKE Date DEC 4 - 1970

Subject U/H for Loop Hydrograph sub-b. VI -- INFLOW INTO STILLWELL LAKE. By D.L.C.

Ch'k. by _____

AREA 1.79 sq miles 1146.2 acres

L = 2.42 miles L_{CA} = 1.10 miles

Assume $C_T = 2.0$ & $640 C_p = 400$

$t_p = C_T (L L_{CA})^{0.3}$ = 2.68 hrs

$t_r = t_p / 5.5$ = 0.49 hrs Use 0.50.

$q_p = 640 C_p / t_p = \frac{400}{2.68}$ = 147.25

Q_p = 149.25 x 1.79 = 267.2 CFS.

Sub-basin VI

AREA = 0.728 sq mi / 465.9 acres

L 1.33 miles. L_{CA} = 0.44 miles.

Assume $C_t = 2.0$ $640 C_p = 400$.

t_p = 0.85 $t_r = t_p / 5.5$ = 0.15 Use t_R = 0.25

t_{p_R} = 0.85 + 0.25(.25 - .15) = 0.85 + .025

= 0.875 hrs / 52.5 min

$q_{p_R} = 640 C_p / t_{p_R} = \frac{400}{0.875}$ = 457. cfs/sq mi.

Q_p = 332.7 CFS.

TAMS

Job No. 1487-15 Sheet 17 of _____

Project INSPECTION: STILWELL LAKE Date Nov. 1975

Subject INFLOW - LAKE : ADJACENT LAND AREA. By D.L.C.

XI & XI Ch'k. by _____

LAKE AREA. 131 acres / 0.205 sq mi 30.5%

Adjacent Land area (XI) 298.7 acres / 0.46 sq mi 69.5%

Σ 429.7 acres / 0.665 sq mi

6 HR PMP 19.52"

Assuming 0.2"/hour loss on adj land area

Excess – 18.32"

Weighted excess rainfall =

$(.692 \times 18.32) + (.308 \times 19.52)$

$= 18.69"$

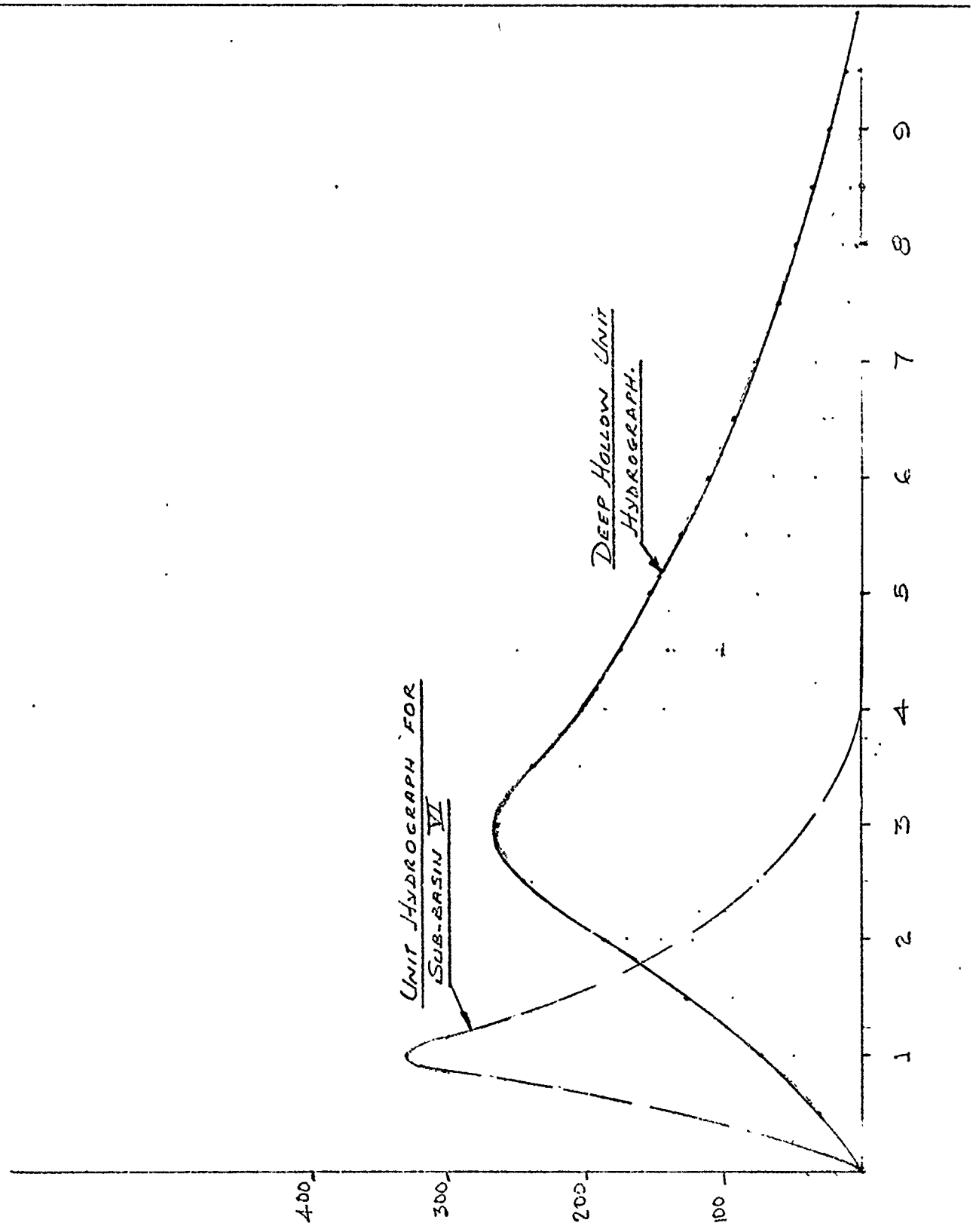
TAMS

Job No. 1487-18 Sheet 13 of _____

Project INSPECTION STILWELL LAKE Date DEC 4, 19??

Subject UNIT HYDROGRAPHS FOR DEEP HOLLOW E, SUB-BASIN VI By D L C.

Ch'k. by _____



TAMS

Job No. 1487-18 Sheet 19 of _____

Project INSPECTION STILLWELL LAKE Date Dec 4, 1978

Subject Unit Hydrograph Ordinates for Deep By D.L.C.

Hollow & Sub Basin VI Ch'k. by _____

Deep Hollow		Sub-Basin VI	
Time (hrs)	Q (cfs)	Time (hrs)	Q (cfs)
0	0	0	0
0.5	30	0.25	35
1.0	70	0.50	135
1.5	125	0.75	240
2.0	185	1.00	333
2.5	245	1.25	279
3.0	265	1.5	218
3.5	240	1.75	170
4.0	208	2.	130
4.5	177	2.25	104
5.0	155	2.5	75
5.5	132	2.75	55
6.0	115	3.	40
6.5	94	3.25	28
7.0	79	3.5	14
7.5	65	3.75	7
8.0	48	4.	0
8.5	34		
9.0	25		
9.5	15		
10.0	6		
10.5	0		

TAMS

Job No. 1487-18 Sheet 20 of _____

Project INSPECTION STILLWELL LAKE Date DEC 8, 78

Subject SPILLWAY ELEVATION - DISCHARGE RELN By D.L.C.

COMPUTATIONS Ch'k. by _____

SPILLWAY LENGTH 160.0'

CREST EL. 602' (MSL)

"OGEE" Shaped CREST.

* TOP OF DAM 617.8'

DAM LENGTH 480.0'

ELEV	HEAD	C_s	Q_s	H_D	C_D	Q_D	Q_T
602	0						
603	1.	3.95	632				632
604	2.		1788				1788
606	4.		5056				5056
608	6.		9288				9288
610	8.		14300				14300
612.	10.		19990				19990
614	12.		26,270				26270
*617.8	15.8	3.95	32400	0			39,692
620	18	3.94	48140	2.2	2.64	3084	51220
624	22	3.93	64880	6.2	2.64	14,590	79470

**

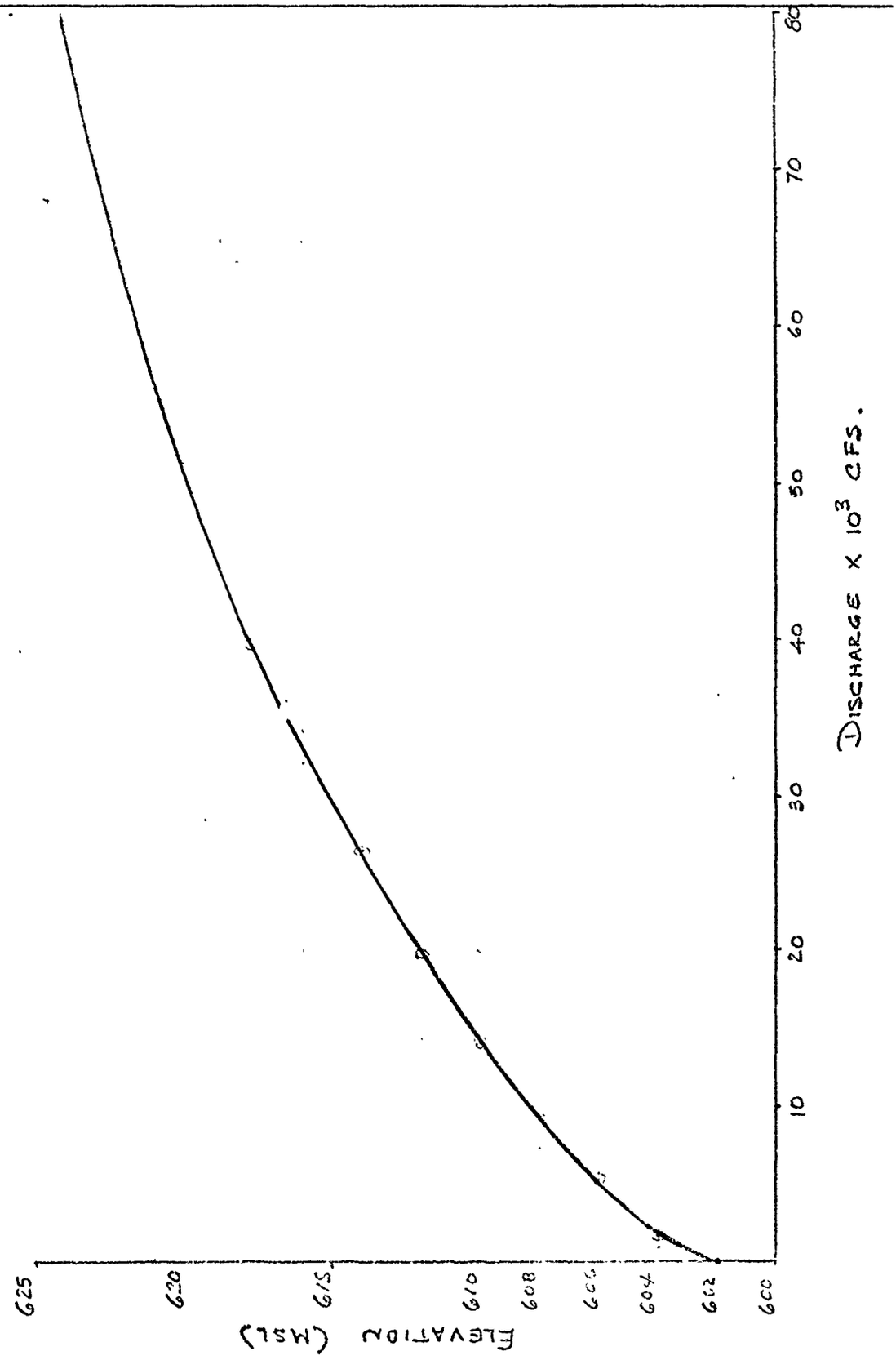
TAMS

Job No. 1487-18 Sheet 20a of _____

Project INSPECTION STILWELL LAKE Date DEC 8, 78

Subject SPILLWAY RATING CURVE By D.L.C.

Ch'k. by _____



TAMS

Job No. 1487-16 Sheet 21 of _____

Project INSPECTION STILLWELL LAKE Date DEC 11 197

Subject _____ By DLC

_____ Ch'k. by _____

EL.	STORAGE (Million Gallons)	(Acre Feet)	Surcharge (Ac Ft)
602	627	1924.3	0
603	670	2056.23	131.9
604	710	2178.99	254.7
606	810	2485.89	561.6
608	910	2792.79	868.5
610	1010	3099.69	1175.4
612	1120	3437.28	1513.
614	1240	3805.56	1881.3
617.8	1455	4465.4	2541.1
620	1620	4971.8	3047.5
624.	1920	5892.5	3968.2

Storages supplied by

MINE LAKE SPF

ME[illegible] OU[illegible]S)	TOTAL RUN-OFF COMPUTED (CFS)	OUTFLOW (CFS)	
0[illegible]000	0.0		0.0
0[illegible]250	270.2	8.90	279.1
0.500	322.6	26.72	349.3
0[illegible]750	387.1	44.35	426.1
1[illegible]000	458.2	61.45	519.7
1.250	697.8	83.73	781.5
1[illegible]500	773.4	111.20	884.6
1[illegible]750	1062.5	145.25	1207.8
2.000	1509.0	197.92	1706.9
2.250	1991.0	307.39	2298.4
2[illegible]500	2639.4	466.78	3106.2
2.750	2851.0	629.58	3480.6
3.000	2948.5	845.30	3793.8
3[illegible]250	2985.6	1344.95	4330.6
3[illegible]500	3018.9	2157.45	5176.4
3.750	2975.1	3179.18	6154.3
4[illegible]000	2954.0	4238.10	7192.1
4[illegible]250	2923.2	5162.45	8085.7
4.500	2910.2	5993.02	8903.2
4[illegible]750	2870.5	6658.62	9529.1
5[illegible]000	2844.8	7093.51	9938.3
5.250	2790.6	7332.04	10122.6
5[illegible]500	2760.0	7410.34	10170.3
5[illegible]750	2656.2	7359.67	10015.9
6.000	2598.1	7232.64	9830.7
6.250	2181.7	6978.83	9160.5
6[illegible]500	2085.3	6579.61	8664.9
6.750	1962.4	6111.43	8073.8
7.000	1830.9	5601.34	7432.2
7[illegible]250	1703.2	5140.04	6843.2
7[illegible]500	1590.8	4669.20	6260.0
7.750	1478.9	4198.13	5677.0
8[illegible]000	1376.2	3730.03	5106.2
8[illegible]250	1269.0	3271.13	4540.2
8.500	1167.7	2830.79	3998.5
8[illegible]750	1069.3	2470.57	3539.9
9[illegible]000	973.9	2148.79	3122.7
9.250	887.6	1866.35	2754.0
9[illegible]500	803.9	1626.20	2430.1
9[illegible]750	728.0	1422.46	2150.5
10.000	653.4	1246.69	1900.1
10.250	586.0	1085.12	1671.1
10[illegible]500	518.5	937.37	1455.9
10[illegible]750	459.5	810.25	1269.8
11.000	400.5	709.14	1109.6
11[illegible]250	349.5	588.75	938.3
11[illegible]500	298.5	461.64	760.1
11.750	254.6	361.84	616.4
12[illegible]000	210.8		
12[illegible]250	175.8		
12.500	140.8		
12[illegible]750	115.2		
13[illegible]000	89.6		

STILLWELL LAKE SAFETY INSPECTION
RESERVOIR ROUTING STILLWELL LAKE
TAMS NEW YORK JOB NO. 1487-17 DEC 78

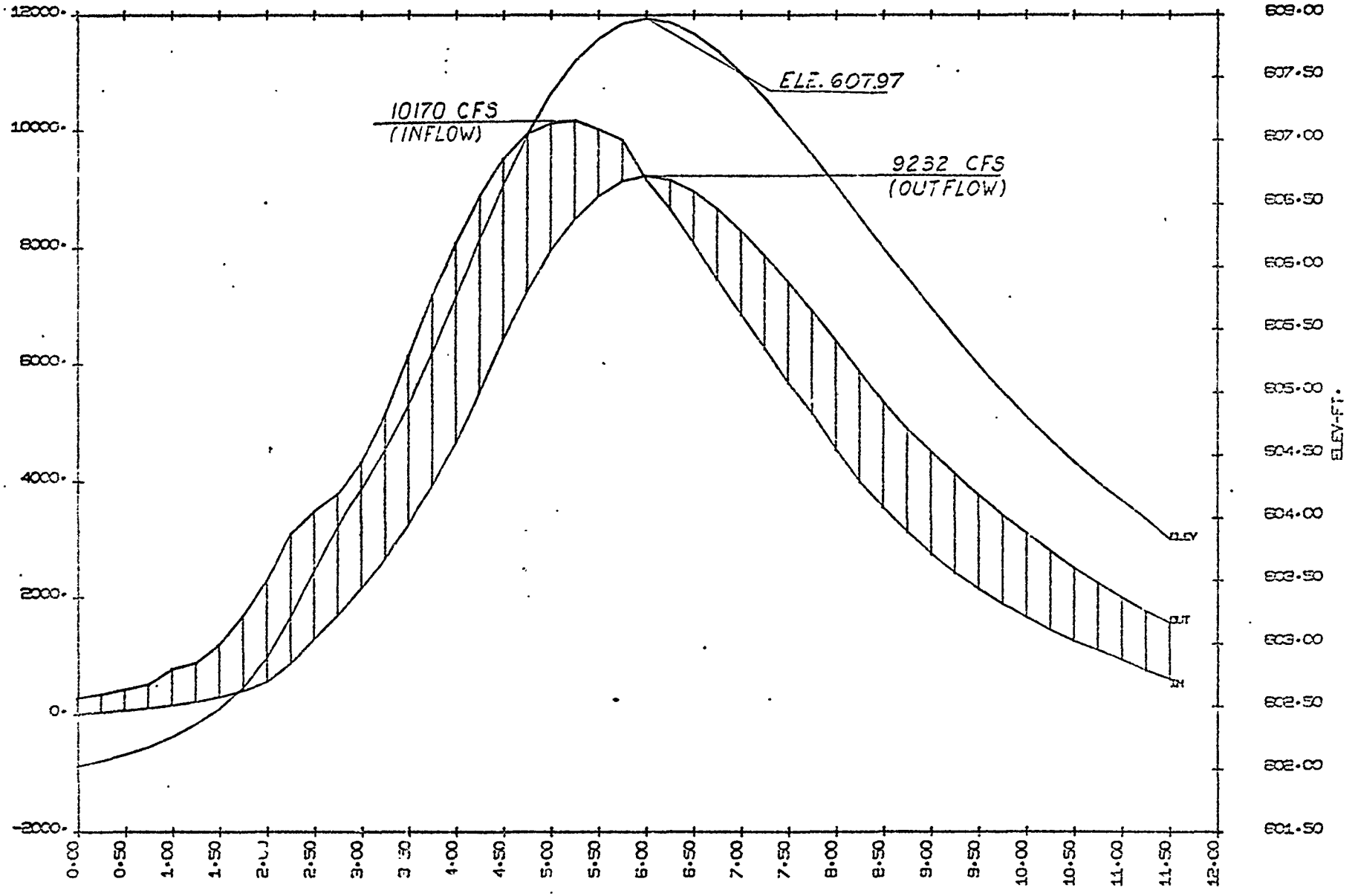
STANDARD PROJECT FLOOD

INPUT PARAMETERS

STARTING ELEV (FT.)	TIME INTERVAL (HOURS)	STARTING TIME (HOURS)	ENDING TIME (HOURS)	PRINT INTERVAL	GATE OPTION	PLOT OPTION	STORAGE COEF.	OUTFLOW COEF.	INFLOW COEF.	TIME COEF.	BREAK TIME
602.00	0.25	0.00	11.75	1	NO	YES	1.000	1.000	1.000	1.000	0.000

RESERVOIR ELEV. (FT.)	RESERVOIR STORAGE (ACFT)	RESERVOIR OUTFLOW (CFS)
602.00	0.0000	0.00
603.00	131.9000	632.00
604.00	254.7000	1788.00
606.00	561.6000	5056.00
608.00	868.5001	9288.00
610.00	1175.4001	14300.00
612.00	1513.0002	19990.00
614.00	1881.3000	26270.00

TIME (HRS)	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (ACFT)	ELEVATION (FT.)
0.00	0.00		0.0000	602.00
0.25	279.10	13.15	2.7451	602.02
0.50	349.30	41.52	8.6671	602.06
0.75	426.10	74.15	15.4767	602.11
1.00	519.70	111.74	23.3205	602.17
1.25	781.50	162.53	33.9206	602.25
1.50	884.60	225.73	47.1106	602.35
1.75	1207.80	303.06	63.2504	602.47
2.00	1706.90	411.86	85.9567	602.65
2.25	2298.40	561.80	117.2497	602.88
2.50	3106.20	882.58	158.5188	603.21
2.75	3480.60	1308.69	203.7839	603.58
3.00	3793.80	1720.25	247.5035	603.94
3.25	4330.60	2175.35	291.0771	604.23
3.50	5176.40	2684.50	338.8909	604.54
3.75	6154.30	3273.16	394.1732	604.90
4.00	7192.10	3944.62	457.2296	605.31
4.25	8085.70	4674.18	525.7431	605.76
4.50	8903.20	5532.29	596.1402	606.22
4.75	9529.10	6445.52	662.3668	606.65
5.00	9938.30	7260.66	721.4799	607.04
5.25	10122.60	7947.29	771.2738	607.36
5.50	10170.30	8492.46	810.8090	607.62
5.75	10015.90	8889.26	839.5843	607.81
6.00	9830.70	9145.60	858.1737	607.93
6.25	9160.50	9232.36	864.4656	607.97
6.50	8664.90	9153.12	858.7188	607.93
6.75	8073.80	8958.82	844.6285	607.84
7.00	7432.20	8659.89	822.9508	607.70
7.25	6843.20	8282.54	795.5854	607.52
7.50	6260.00	7853.44	764.4674	607.32
7.75	5677.00	7386.16	730.5808	607.10
8.00	5160.20	6898.40	695.2089	606.87
8.25	4540.20	6390.65	658.3874	606.63
8.50	3998.50	5864.77	620.2517	606.38
8.75	3539.90	5345.28	582.5784	606.13
9.00	3122.70	4892.05	546.2038	605.89
9.25	2754.00	4506.22	509.9707	605.66
9.50	2430.10	4128.20	474.4705	605.43
9.75	2150.50	3765.25	440.3850	605.21
10.00	1900.10	3421.63	408.1161	604.99
10.25	1671.10	3098.54	377.7744	604.80
10.50	1455.90	2795.40	349.3056	604.61
10.75	1269.80	2512.49	322.7377	604.44
11.00	1109.60	2251.26	298.2054	604.28
11.25	938.30	2008.88	275.4438	604.13
11.50	760.10	1780.77	253.9327	603.99
11.75	616.40	1587.67	233.4196	603.82
MAX. VALUES	10170.30	9232.36		607.97
MIN. VALVES	0.00	0.00		602.00


ELE. 607.97
10170 CFS
(INFLOW)
9232 CFS
(OUTFLOW)
ELEV
OUT
IN
12000
10000
8000
6000
4000
2000
0
-2000
609.00
607.50
607.00
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601.50
ELEV-FT.
0.00
0.50
1.00
1.50
2.00
2.50
3.00
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10.50
11.00
11.50
12.00
TIME-HRS

PMF INFLOW HYDROGRAPH — MINE LAKE

TIME (HOURS)	TOTAL RUN-OFF COMPUTED (CFS)	PMF OUTFLOW (CFS)	
0.000	0.0		0.0
0.250	540.5	17.80	558.3
0.500	645.2	53.45	698.7
0.750	774.3	88.72	863.0
1.000	916.4	122.93	1039.3
1.250	1395.7	167.48	1563.2
1.500	1546.9	222.42	1769.3
1.750	2125.1	336.53	2461.6
2.000	3018.1	640.24	3658.3
2.250	3982.1	1172.75	5154.9
2.500	5278.9	2032.52	7311.4
2.750	5702.1	3981.82	9683.9
3.000	5897.0	7040.37	12937.4
3.250	5971.2	10870.50	16841.7
3.500	6037.8	14714.03	20751.8
3.750	5950.3	17530.84	23481.1
4.000	5908.1	19316.69	25224.8
4.250	5846.5	20252.73	26099.2
4.500	5820.4	20470.91	26291.3
4.750	5741.0	20275.17	26016.2
5.000	5689.6	19845.47	25535.1
5.250	5581.3	19237.39	24818.7
5.500	5520.1	18526.80	24046.9
5.750	5312.5	17786.93	23099.4
6.000	5196.3	17063.86	22260.2
6.250	4363.4	15880.87	20244.3
6.500	4170.7	14367.03	18537.7
6.750	3924.9	13063.13	16988.0
7.000	3661.8	11835.10	15496.9
7.250	3406.4	10640.13	14046.5
7.500	3181.6	9494.78	12676.4
7.750	2957.9	8407.74	11365.6
8.000	2752.5	7371.90	10124.4
8.250	2538.0	6388.38	8926.4
8.500	2335.5	5485.00	7820.5
8.750	2138.6	4727.01	6865.6
9.000	1947.9	4017.51	5965.4
9.250	1775.2	3374.03	5149.2
9.500	1607.8	2803.58	4411.4
9.750	1456.0	2382.74	3838.7
10.000	1306.8	2028.28	3335.1
10.250	1172.0	1727.73	2899.7
10.500	1037.1	1483.37	2520.5
10.750	919.1	1275.34	2194.4
11.000	801.0	1089.72	1890.7
11.250	699.1	871.22	1570.3
11.500	597.1	679.11	1276.2
11.750	509.3	532.62	1041.9
12.000	421.6		
12.250	351.6		

STILLWELL LAKE SAFETY INSPECTION
RESERVOIR ROUTING STILLWELL LAKE
TAMS NEW YORK JOB NO. 1487-17 DEC 78

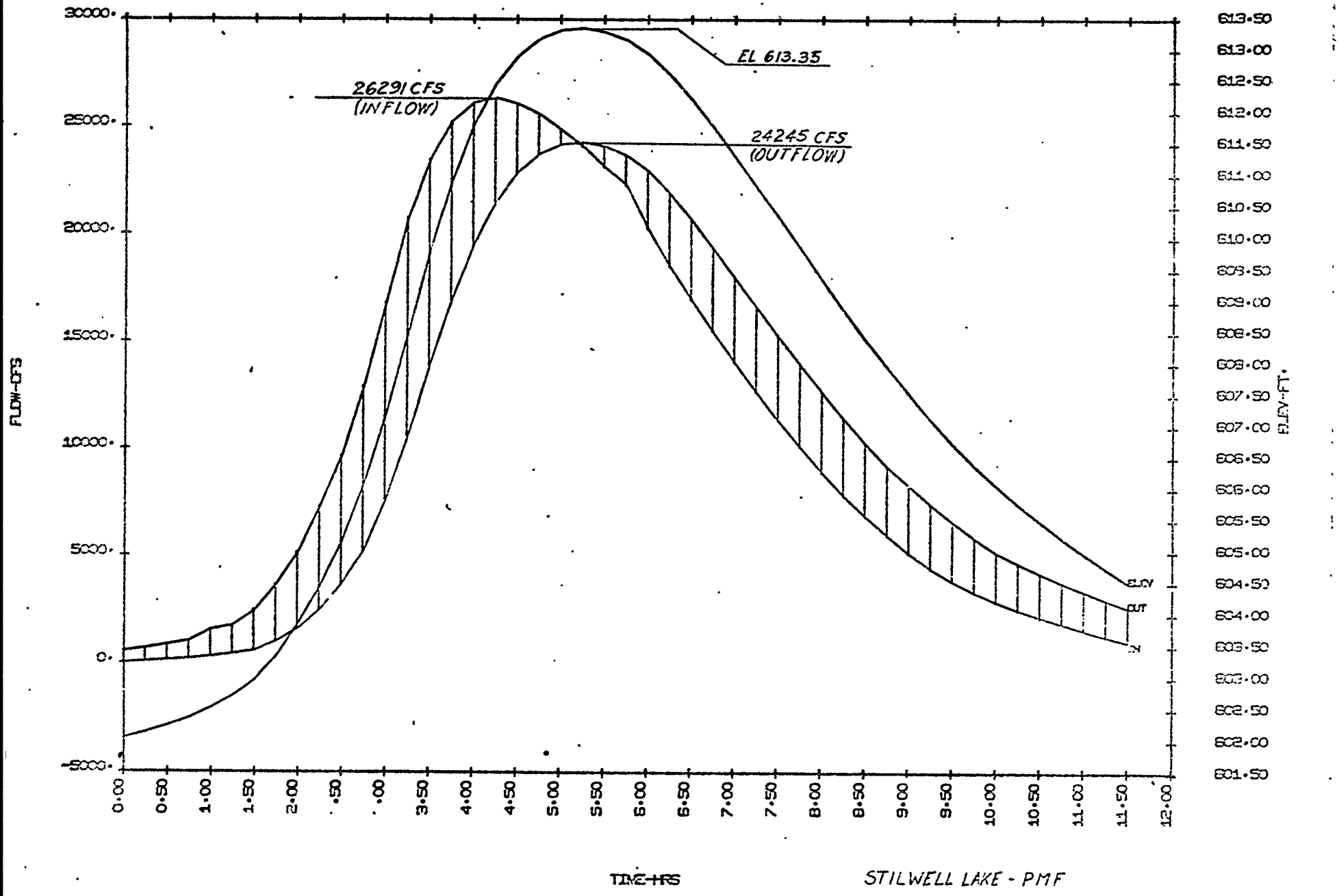
PROBABLE MAXIMUM FLOOD

INPUT PARAMETERS

STARTING ELEV (FT.)	TIME INTERVAL (HOURS)	STARTING TIME (HOURS)	ENDING TIME (HOURS)	PRINT INTERVAL	GATE OPTION	PLOT OPTION	STORAGE COEF.	OUTFLOW COEF.	INFLOW COEF.	TIME COEF.	BREAK TIME
602.00	0.25	0.00	11.75	1	NO	YES	1.000	1.000	1.000	1.000	0.000

RESERVOIR ELEV. (FT.)	RESERVOIR STORAGE (ACFT)	RESERVOIR OUTFLOW (CFS)
602.00	0.0000	0.00
603.00	131.9000	632.00
604.00	254.7000	1788.00
606.00	561.6000	5056.00
608.00	868.5001	9288.00
610.00	1175.4001	14300.00
612.00	1513.0002	19990.00
614.00	1881.3000	26270.00

TIME (HRS)	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (ACFT)	ELEVATION (FT.)
0.00	0.00		0.0000	602.00
0.25	558.30	26.31	5.4912	602.04
0.50	698.70	83.07	17.3371	602.13
0.75	863.00	148.84	31.0633	602.23
1.00	1039.30	224.46	46.8458	602.35
1.25	1563.20	325.95	68.0277	602.51
1.50	1769.30	452.28	94.3931	602.71
1.75	2461.60	609.04	127.1098	602.96
2.00	3658.30	1023.42	173.4805	603.33
2.25	5154.90	1621.39	237.0023	603.85
2.50	7311.40	2513.96	322.8760	604.44
2.75	9683.90	3695.64	433.8485	605.16
3.00	12937.40	5239.69	574.9217	606.08
3.25	16841.70	7631.90	748.4018	607.21
3.50	20751.60	10592.79	948.3956	608.52
3.75	23481.10	13892.65	1150.4570	609.83
4.00	25224.80	16958.46	1333.1325	610.93
4.25	26099.20	19517.49	1484.9653	611.83
4.50	26291.30	21495.92	1601.3173	612.47
4.75	26016.20	22878.77	1682.4167	612.92
5.00	25535.10	23738.82	1732.8554	613.19
5.25	24818.70	24165.76	1757.8942	613.32
5.50	24046.90	24245.04	1762.5434	613.35
5.75	23099.40	24045.56	1750.8447	613.29
6.00	22260.20	23640.08	1727.0647	613.16
6.25	20244.30	22931.16	1685.4890	612.93
6.50	18537.70	21880.12	1623.8496	612.60
6.75	16928.00	20657.75	1552.1618	612.21
7.00	15496.90	19353.76	1475.2512	611.77
7.25	14046.50	18006.53	1395.3171	611.30
7.50	12676.40	16640.78	1314.2836	610.82
7.75	11365.60	15282.46	1233.6916	610.34
8.00	10124.40	13956.61	1154.4960	609.86
8.25	8926.40	12689.13	1076.7622	609.35
8.50	7820.50	11453.32	1001.0891	608.86
8.75	6865.60	10276.32	929.0179	608.39
9.00	5965.40	9188.02	861.2501	607.95
9.25	5149.20	8287.96	795.9786	607.52
9.50	4411.40	7418.41	732.9195	607.11
9.75	3838.70	6604.98	673.7131	606.73
10.00	3335.10	5854.54	619.5094	606.37
10.25	2899.70	5176.00	570.3023	606.05
10.50	2520.50	4566.28	525.0015	605.76
10.75	2194.40	4210.32	482.1822	605.48
11.00	1890.70	3782.22	441.9790	605.22
11.25	1570.30	3377.04	403.9280	604.97
11.50	1276.20	2991.19	367.6932	604.73
11.75	1041.90	2629.37	333.7145	604.51
MAX. VALUES	26291.30	24245.04		613.35
MIN. VALVES	0.00	0.00		602.00



STILWELL LAKE - PMF